CAPITAL FORMATION IN EGYPTIAN INDUSTRY AND AGRICULTURE, 1882 - 1967

SAMIR MOHAMED RADWAN

Thesis Submitted for the Degree
of Ph.D. at the University of London,
School of Oriental and African Studies,
September, 1973.

ABSTRACT

Current interest in the measurement of capital stems from its importance as a symptom and a cause of economic growth. For this purpose capital is understood in the real sense, and we are interested in it as a factor of production and the contribution it makes to output. Lack of quantitative enquiries into the historical pattern of Egypt's economic growth in general, and long-term estimates of capital formation in particular, account for the fact that the role played by real capital in the process of growth is quite uncertain and not very well understood.

It is the primary objective of this study, therefore, to draw on available statistics in order to measure gross and net fixed capital formation and capital stock in Egyptian agriculture and industry, at current and constant (1960) prices, covering the period 1882-1967. The estimation procedure involved the application in the first place of the commodity-flow approach, and wherever data were available, the expenditure approach was also followed. The emphasis is

almost exclusively on one aspect of capital formation; yearly capital accumulation in terms of additions to fixed capital stock. Consequently, little attention is given here to both the sources of investment funds and the determinants of investment decisions.

An attempt is also made in this study to describe the long-term trends in the rate and structure of capital accumulation and to outline the broad economic, institutional and historical factors affecting the rate and pattern of growth of capital formation in agriculture and industry. Moreover, the two sectors are discussed together in order to compare their performance and contrast the types of structural change that took place. Finally, the study concludes by some speculation on the general pattern of growth of the Egyptian economy as a whole.

ACKNOWLEDGEMENTS

It goes without saying that a study such as this could not have been undertaken without the assistance of a large number of individuals and institutions. If I desist from writing here a long list of names, it is not because my indebtedness is smaller or less warmly acknowledged, but because it is so widely diffused.

The greatest debt is the most difficult to express. Such is my debt to Dr. P.K. O'Brien, my supervisor. It is to his penetrating criticisms and suggestions, his meticulous revision of every line and, above all, his unfailing encouragement that this study owes a great deal. It is equally impossible to express adequately my gratitude to Mr. Robert E. Mabro of St. Antony's College, Oxford and Mr. John Odling-Smee of the London School of Economics for the time and effort which they have devoted to this study and the knowledge and insight which they have so generously and patiently imparted. I am also deeply indebted to Professor Edith Penrose, who supervised the early stages of my research, for her challenging criticism and benevolent guidance. Dr. E.R.J. Owen and Dr. R. Kahil of St. Antony's College, read the greater part of the manuscript and made invaluable comments. Where I have failed to listen to their good advice, the responsibility is entirely mine.

In the course of my field work in Egypt during two visits (1969 and 1972) the amassing of statistical information would have been impossible without the welcoming help of friends and colleagues. Dr. Amr Mohei el-Din and Dr. Nader Fergany (Faculty of Economics), Dr. Alphonse Azia and

Mr. Sayed el-Bawab (Ministry of Planning), Dr. Fawzi R. Fahmy (Institute of National Planning) and Mr. Amin Hilmy Kamel (Under-Secretary at the Ministry of Industry), made bearable an otherwise hectic game of 'data-hunting'. I am also grateful to Mr. Gamal Askar (President of the Central Agency for Public Mobilization and Statistics), Dr. Ismail Sabry Abdulla (Minister of Planning), Dr. Nazih Dief (ex-Minister of Treasury), Dr. M.Z. Shafei (UNESOB, BEIRUT), Dr. Ahmed El- Murshidy (under-Secretary at the Ministry of Planning) and Dr. Sayed H. Abdel-Rahman (under-Secretary at the Central Auditing Organization), who gave generously of their time and experience during lengthy discussions and interviews.

My studies at the University of London were made possible only through the kind scholarships granted to me by the School of Oriental and African Studies and the Faculty of Economics, Cairo University. The hospitality of St. Antony's College and the facilities provided by the Middle East Centre and the Institute of Economics and Statistics, Oxford, were particularly helpful during the final stages of this study.

I also wish to acknowledge with thanks the forebearance and skill of Vi Hiscock, Judy Chance and Lydia Foreman who typed the manuscript.

Finally, a different and even greater obligation I try, inadequately, to acknowledge is to Lilo for skilfully typing the successive drafts, patiently reading the proofs, and constantly encouraging me to finish.

Oxford,
September 1973.

S.M.R.

ABBREVIATIONS

C.F.	Capital Formation
C.S.	Capital Stock
D.C.F.	Domestic Capital Formation
E.C.	L'Egypte Contemporaine
F.C.F.	Fixed Capital Formation
F.C.S.	Fixed Capital Stock
G.C.F.	Gross Capital Formation
G.F.C.F.	Gross Fixed Capital Formation
G.F.C.S.	Gross Fixed Capital Stock
I.N.P.	Institute of National Planning
N.B.E.R.	National Bureau of Economic Research
N.F.C.F.	Net Fixed Capital Formation
N.F.C.S.	Net Fixed Capital Stock
N.P.C.	National Planning Committee

WEIGHTS AND MEASURES

£E refers to Egyptian Pound. This was officially at par with the Sterling (=£1.0.6.) throughout the period of study until May 1962. Since then the rate has been constantly changing and at present (1972) the official selling rate is £E1 = £0.90 and $2.27, and the buying rate £E1 = £0.59 and $1.7. The £E = 100 piasters or 1000 milliemes.

1 Feddan = 1.038 acres = 0.42 hectar = 4201 sq. meters.

1 Kantar = 44.928 Kg. = 99.05 lbs.

1 Ardeb = 198 litres. The weight of 1 ardeb varies for different crops, e.g. wheat = 150 Kg., maize = 140 Kg., beans = 155 Kg., millet = 140 and barley = 120 Kg.

1 Dariba of rice = approximately 935 Kg.

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INTRODUCTION

The present study has two major objectives: first, measurement of gross and net fixed capital formation and capital stock in Egyptian agriculture and industry, at current and constant prices, covering the period 1882-1967, and secondly, outlining the broad historical, institutional and economic factors affecting the rate and structure of capital accumulation during this period. As such, it can be regarded as a study in quantitative economic history, or, in Kuznets' terms "an attempt to provide an empirical foundation to economic generalizations".[1] The estimates cover such a long period of time as to allow meaningful inferences about the process of capital formation under a variety of institutional settings, and an appraisal of the present performance in historical perspective. They also make it possible to test, against quantitative evidence, traditional histriography concerning vital aspects of Egypt's experience of economic growth.

The emphasis in this study is almost exclusively on one aspect of capital formation; annual capital accumulation in terms of additions to fixed capital stock. It is beyond the scope of the present study, therefore, to deal in any detail with the all-important aspect of investment finance, nor is it our intention to test any specific micro-thesis on the determinants of investment-decisions.

Limitations of time and space confined the coverage of estimates only to the two commodity sectors; industry and

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1. S. Kuznets, "Summary of Discussion and Postscripts", Journal of Economic History, Vol.XVII, No.4, December 1957, p.553.

agriculture, leaving out important activities such as building and construction and services, especially transport. The present attempt represents but a modest start and it is hoped that further attempts would follow, not only to complete the estimate of capital formation to include all sectors, but also to prepare data for the long-term measurement of other aspects of economic growth.

Furthermore, there is no claim that the result of our estimates are definitive as is repeatedly emphasized in the text, and it is expected that future revisions and refinements would be made. However, no effort was spared to improve the measurement, and we believe that the estimates enjoy a reasonably high degree of reliability which was confirmed by cross-checking our results with other independent indicators of change in capital formation.

The choice of the period 1882-1967 was primarily determined by the availability of statistical data. Egypt had her first comprehensive population census in 1882 and since, the Department of Statistics and Census began to issue such important publications as the "Annuaire Statistique" from 1909, the "Annual Statement of Foreign Trade" from 1884, and the "Statistique des Sociétés Anonymes" from 1907.

The estimation procedure involved the application in the first place of the commodity-flow approach, but the expenditure approach was also followed wherever data were available as in the case of "Irrigation and Drainage". Moreover, for the most part, the measurements were based on Egyptian primary sources after being extensively and critically appraised.

The study falls in six chapters divided into two related parts. Part I, Measurement, covering chapters 1-3, opens with

a brief critical survey of conventional concepts and definitions of capital formation, methods of estimation and a general appraisal of the significance and limitations of capital measures as indicators of economic growth. Chapters 2 and 3 explain in detail the ways the series of capital formation were derived for agriculture and industry respectively, together with a discussion of sources and limitations of results.

Part II, Analysis, contains an attempt to describe the long-term trends in the rate and structure of capital accumulation, and to outline the broad historical, institutional and economic factors affecting the pattern of growth of capital formation in agriculture (Chapter 4) and industry (Chapter 5). The study concludes with a rather speculative essay (Chapter 6) which tries to synthesize a highly tentative picture of Egypt's experience of economic growth as revealed by our capital series in combination with other quantitative and descriptive material on the various aspects of growth during the period of study. It should be stressed here that no attempt is made to build anything like a formal model of Egypt's economic growth but rather to bring together the various themes that emerge from the study in a systematic and comparative framework.

Finally, statistical tables included in the text are only those containing results of the measurements or those found to be essential for the argument. Other detailed material necessary for the estimates or judged to be of interest for future research, are arranged in the Statistical Appendix in such a way as to correspond with the relevant chapter where they are used.

PART I: MEASUREMENT

CHAPTER ONE

CONCEPTS AND DEFINITIONS OF CAPITAL FORMATION

Capital for any given country as commonly measured includes all goods produced for use in future productive processes -- machinery, equipment, plants, buildings, other construction and works, and producers' stock of raw materials, semi-finished and finished goods. Domestic Capital Formation (DCF) is that part of a country's current output and imports which is not consumed or exported during the accounting period but set aside as additions to its stock of Capital Goods. Net Capital Formation (NCF) is distinguished from Gross Capital Formation (GCF) in that it is measured after allowances are made for depreciation, obsolescence and accidental damage to fixed Capital. Conceptually, NCF represents the addition to Fixed Capital (FCF) such as building, other construction and works, equipment and machinery, and Working Capital (producers' stock) available for future production.[1]

These general definitions are deceptively simple. When the estimator proceeds to measurement, a host of difficult decisions loom up and must be resolved in a manner that is consistent with the definitions and abjectives. No attempt will be made in this chapter to discuss in detail the various problems which arise in the definition and measurement of capital formation and capital stock. These problems have been the subject of numerous studies, the

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1. U.N., Concepts and Definitions of Capital Formation, Statistical Papers, series F, No.3, New York, 1953.

results of which provided sound grounds for generalizations and more or less standardized concepts and methods.[2] In general, the recommendations of the UN "Concepts and Definitions of Capital Formation" are basically accepted in this study, and no more than a brief treatment will be given to summarize the basic concepts, critically review the main methods of estimation and broadly outline their significance and limitations, emphasizing only points of special interest for the present estimate, leaving specific methodological problems to be dealt with as they arise in the actual measurement. It should be pointed out that the present estimates cover only fixed capital formation and exclude investment in producers' stocks and work in progress (i.e. working capital) on which it was extremely difficult to obtain data. This means that our principal concern is with the measurement of three basic flows; gross fixed capital formation (GFCF), net fixed capital formation (NFCF) and depreciation as well as gross and net fixed capital stock.

1.1 Gross Fixed Capital Formation

Gross fixed capital formation, or investment, can be defined as the additions to the stock of fixed assets (machinery, equipment and vehicles, buildings and other construction and works) available for future production. Several problems arise in connexion with this definition. First, future production is not only facilitated by additions to a country's stock of capital goods, but also by improvements in technical training, education, research and health

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2. See for example, UN, Concepts and Definitions..., op. cit.; R.W. Goldsmith, The National Wealth of the United States in the Postwar Period, N.B.E.R., Princeton, 1962; N.B.E.R., Measuring the Nation's Wealth, Studies in Income and Wealth, vol.29, Washington, 1964; and N.B.E.R., Problems of Capital Formation, Studies in Income and Wealth, vol.19, Princeton, 1957.

which improve technology and increase productivity of the labour force. Thus, depending on the purpose for which statistics are to be used, a decision has to be taken whether C.F. can be defined in such a broad way as to include outlay on these items, i.e. investment in human capital, or in a narrower sense covering only additions to the stock of physical assets.[3] It is the narrow definition which is adopted in the present estimates as it is mainly concerned with the measurement of changes in a country's physical productive capacity.

A further problem arises in connexion with consumer durables purchased by households. Such commodities as private cars and household equipment, which typically yield services to their users over a number of accounting periods, should logically be included in C.F. However, consumer durables, with the exception of dwellings, will be treated as current outlays on consumption on the practical grounds that the serives they yield are generally not marketed, and that depreciation is difficult to estimate.[4]

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3. The dividing line between the broad and narrow definitions is necessarily arbitrary. Domar, for example, suggests the inclusion in C.F. of all "productivity-sustaining outlays, such as food and shelter and minimum of education", while these are considered as current consumption by many national accountants. See Kuznets, "International Differences in Capital Formation and Financing", in Capital Formation and Economic Growth, N.B.E.R., Princeton, 1955, pp.107-111.

4. U.N., Concepts and Definitions of Capital Formation, op. cit., p.8. Some countries of Asia, however, include consumer durables in C.F. on the grounds that in those underdeveloped countries such goods are more likely to be used by firms or governments rather than households. See B. Ramamurti and Hans Th. Pedersen, "Statistical Methods of Estimating Capital Formation Expenditure in ECAFE countries", in Asian Studies in Income and Wealth, London, 1965, p.108.

Thirdly, there is the wider problem of the distinction between capital and current expenditure. This is particularly important in the treatment of repair and maintenance costs. In principle, expenditures on capital equipment and structures which extend the normal life of the asset or raise its productivity should be included in C.F., while the costs of routine repairs which are necessary simply to maintain an asset in normal working order, should be considered as current cost.[5] In practice, however, the problem is not that simple. It is difficult, especially when the commodity flow approach is used, to distinguish between what is used for minor repairs and what lengthens the economic life of a capital item since the same commodity can be used for either purpose.

Furthermore, this distinction is more complicated in the case of assets which do not have a normal life-cycle (dams, bridges, railways) and which appear to have an indefinite physical life if properly maintained. In such cases where the distinction between minor repairs and those which extend the normal life of an asset is difficult, it has been recommended that all repair and maintenance costs should be treated as C.F. especially in less developed countries where fixed capital assets are most probably used beyond what is considered to be their normal life in more developed countries, and where minor repairs required to keep them running may also be higher.[6] An alternative treatment, which is

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5. U.N., Concepts and Definitions..., op. cit., pp.12-13 and J. Hibbert, "Modern Practices and Conventions in Measuring Capital Formation in the National Accounts", in J.P.P. Higgins, S. Pollard and J.E. Ginarlis (eds.) Aspects of Capital Investment in Great Britain, 1750-1850: A Preliminary Survey, London, 1971, p.12.

6. Ramamurti and Pedersen, Capital Formation in ECAFE Countries, op. cit., p.108.

followed in the present study, is not to capitalise these costs at all, neither to allow for depreciation, on the assumption that maintenance and repairs keep the asset intact as long as it is in use. Both methods are arbitrary, but the latter has the advantage of avoiding the erroneous treatment of a current cost, maintenance, as capital expenditure.

Having outlined the definition and scope of C.F., I shall now turn to problems of measurement. C.F. may be measured at any of the three stages in the process; the accumulation of funds, expenditure of the funds or the production of capital goods.[7] It is the two latter stages that concern us since the first is directly related to savings rather than production. We can therefore distinguish between two methods generally used for measuring C.F.; the expenditure approach and the commodity-flow approach.

According to the expenditure approach, FCF is defined as the expenditure on capital goods including such expenses as those for transport, installation, brokerage and legal and other services.[8] This method has two main advantages. First of all, figures on expenditure can be collected according to definitions consistent with other statistics for the national income accounts. Secondly, data collected in this way can far more readily be analysed by purchasing industry and institutional sector than figures derived from the alternative method.[9] However, the expenditure method requires the

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7. U.N. Concepts and Definitions..., op. cit., pp.9-10.
8. Ibid., p.10.
9. Hibbert, Modern Practices and Conventions in Measuring C.F., op. cit., pp.14-15.

availability of fairly organized and consistent accounting records which are usually lacking in less developed countries. This explains, partly, the reliance of the majority of these countries on the commodity-flow approach.

FCF in the commodity flow approach is measured in terms of "domestic production plus imports of capital goods less those, other than dwellings, sold to households or exported" ...."data on transport costs, dealers' margins and purchased services in connection with the acquisition and installation of fixed capital goods are needed to supplement production data, since capital formation is valued at cost to the user of the capital goods".[10]

Since a substantial amount of capital goods are imported, and because foreign trade statistics are easily accessible, it is common practice in less developed countries to rely heavily on foreign trade statistics together with whatever data are available on domestic construction, in preparing estimates of C.F. from the supply side. This method of estimation involves identifying items of capital goods imports as to economic activities most likely to be using them. On the basis of the c.i.f. value of such imports an appropriate mark-up ratio is added to allow for distribution and installation costs. To account for the domestic component of C.F., an estimate of investment in construction (usually based on data on construction permits) is added to the derived value of imported machinery.[11]

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10. U.N., Concepts and Definitions..., op. cit., p.10.

11. R.W. Hooley, "The Measurement of Capital Formation in Underdeveloped Countries", Review of Economics and Statistics, vol. 49, No.2, May 1967, pp.201-6.

The experience of less developed countries estimating FCF according to the commodity flow approach has revealed that this method suffers from certain inaccuracies. First, it is often difficult for imported equipment to be allocated by industry. Few capital goods can be identified as to their "end use" simply from their description, and the common practice is to allocate them by "major expected use". This results in the estimates being highly aggregative and cannot be expected to yield useful results concerning the industrial distribution of C.F. Secondly, the mark-ups used in estimating final value of C.F. on the basis of c.i.f. and ex-factory values are often quite crude. The majority of less developed countries use an overall percentage based on an outdated and partial inquiry with dealers, instead of undertaking a systematic survey in an effort to estimate these ratios.[12] Finally, most of these countries have so far not succeeded in covering satisfactorily the unorganised or non-monetised sector of the economy in their estimates of C.F. Investment in the primary industries taking the form of residential and farm buildings, land improvements and hand tools, is generally not counted. This is a serious omission since these activities are most likely to represent a truly large proportion of agricultural C.F. in those countries in the early stages of development.[13] An attempt is made in this study to account for such activities especially rural dwellings and farm buildings and agricultural tools and implements.

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12. Ramamurti and Pedersen, Capital Formation in ECAFE Countries, op. cit., pp.109-110.

13. Hooley, Capital Formation in Underdeveloped Countries, op. cit., p.202.

Estimates of C.F. in the present study involved the application in the first place of the commodity flow approach, but the expenditure approach was also followed whenever data were available as in the case of "Irrigation and Drainage".

1.2 Alternative Price Basis

Whichever method of measuring capital formation is adopted, the estimates are made in money terms at the prices ruling during the period in which the capital formation has taken place. For most purposes of economic analysis, it is more useful if C.F. can be measured in terms of a fixed set of prices. It is customary in most countries to deflate fixed investment by an appropriate price index, usually a domestic wholesale price index, so that the adjusted data represent investment in constant prices. But the use of such a deflator, which is supposed to remove the distorting effects of price changes" may introduce new biases of serious magnitude!"[14] Alternatively, it has been argued that in less developed countries, where the greater part of capital goods is imported, "there is only one possible cause of price change from year to year, and that is a change in equipment prices in the exporting country. Therefore, the appropriate deflator is the price index of equipment in the exporting country".[15] While the latter view accounts for an important source of price changes, it fails, however, to account for that growing component of C.F. provided domestically and represented in particular by the cost of labour and building and construction materials. It is suggested in this study therefore that a better deflator would combine the different prices affecting capital goods' prices; the price of capital goods imports in the exporting country, domestic prices of building materials and metals, and wages paid to local labour.

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14. Hooley, Capital Formation in Underdeveloped Countries, op. cit., p.205.

15. Ibid.

Constant price estimates of gross fixed capital formation in an asset were estimated for various sub-periods within the whole period under review. The resulting series were then linked at the overlapping years and expressed at 1960 prices. It is, of course, unsatisfactory to use the same prices over such a long period, but it simplifies the presentation and it is likely that any errors thereby introduced are small compared with other errors in the data. The year 1960 was chosen for three reasons. First; it was a "normal" year in the sense that it was not dominated by an exceptional event such as war, crop failure or depression. Secondly, it can be regarded as a demarkation year in Egypt's modern economic history as it was the opening year of the country's first Five-year Plan (1960-65), and was followed by important institutional changes that altered the character of the economy. Thirdly, the quality and availability of data on the Egyptian economy, especially those prepared for the Plan, had reached a satisfactory level by 1960.

Although it is not intended here to raise the complex problem of changes in the quality of capital goods[16], it must, however, be emphasized that the price deflators used in this study probably do not make sufficient allowance for such quality changes except in so far as they are reflected in a corresponding change in the cost of the inputs of labour and material required to construct the capital goods. A

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16. For a detailed discussion of this problem see; E.F. Denison, "Theoretical Aspects of Quality Change, Capital Consumption, and Net Capital Formation", in N.B.E.R., Problems of Capital Formation, Studies in Income and Wealth, Vol.19, Princeton 1957, pp.215-61, and Hibbert, "Modern Practices and Conventions in Measuring Capital Formation", op. cit., pp.20-22.

major implication of this, as Feinstein points out, is that the estimates of depreciation (at current or constant prices) represent a deduction from gross capital formation of the cost of replacing that part of the capital stock which has become worn-out or obsolete during the year with other assets of the same cost, even though the quality of new assets may be appreciably higher. Therefore, the corresponding estimates of net capital formation are not strictly a measure of the change in the quality or productive capacity of the assets[17].

17. C.H. Feinstein, Domestic Capital Formation in the United Kingdom, 1920-1938, Cambridge University Press, 1965, p.6.

1.3 Depreciation

Net fixed capital formation is distinguished from gross fixed capital formation in that it is measured after allowances are made for capital consumption, or depreciation. Generally, depreciation can be defined as "the amount which it seems right to charge against the production of the year to allow for the fact that equipment originally charged to capital account has become older, more worn and perhaps also more obsolete during the year".[18] However, what "seems right" is a vague expression, and in practice estimates of depreciation depend on the concept and the method of measurement adopted.[19] Depreciation as an economic concept, may be generally defined as "the decrease in value at current prices of durable physical assets. Alternatively, it is often taken to represent the present cost of replacing the current loss in the economic worth from wear and tear and obsolescence of physical capital".[20] Estimation of this concept is usually difficult not only due to lack of adequate information, but also because it is not readily translatable into a unique definition for measurement purposes. Most estimates, therefore, follow the accounting practice where the cost or other basic value of tangible capital assets, less salvage (if any) is distributed over the estimated useful life of the asset in a systematic and rational manner. It is a process of allocation, not of valuation. Depreciation for the year is the portion of the total charge under such a system that is allocated to the year. Although the allocation may properly take

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18. C.H. Feinstein, op. cit., p.3.
19. E.L. Grant and P.T. Norton, Depreciation, New York, 1949, pp.11-20; for a discussion of various concepts of depreciation.
20. U.N., Concepts and Definitions..., op. cit., p.16.

into account occurances during the year, it is not intended to be a measurement of the effect of all such occurences.[21]

Conceptual considerations aside, the actual estimates of depreciation are considerably affected by the choice of the depreciation formula, i.e. the way in which it is assumed that capital components use up their economic value over the course of their expected service lives.[22] A good deal has been written on this aspect and it seems to be generally agreed that there is in fact no unique way of measuring depreciation, and that all methods are inherently arbitrary.[23] However, depreciation estimates in practice are almost always made according to either of the two widely accepted methods; the "straight-line" or the "reducing balance".[24]

On the first, or straight-line, method, the cost of the asset less its estimated salvage value, is deducted in equal annual instalments over the period of its estimated useful life. Ordinarily, the depreciation deduction is computed by applying a depreciation rate expressed as a percentage to the cost to be recovered, but it also may be computed by dividing that cost by the estimated useful life. In both cases, 1/L of the value of an asset is charged against production in each of its estimated L years of life. "The practical simplicity in accounting records required and the

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21. Grant and Norton, Depreciation, op. cit., p.12.
22. Daniel Creamer, "Measuring Capital Input for Total Factor Productivity Analysis: Comments by a Sometime Estimator", Review of Income and Wealth, Series 18, No.1, March 1972.
23. Denison, "Theoretical Aspects of Quality Change...," op. cit., pp.215-17 and 238-40.
24. There are many other methods of depreciation such as the "retirement" method, the "replacement" method, etc., but these two are the most universally accepted. See Grant and Norton, op. cit., pp.184-204.

ease and facility by which revisions or changing life estimates may be applied tend to make this method the most acceptable one for general use."[25]

While the straight-line method writes off the same amount in every year during the life of each asset, the second, or reducing balance method writes off progressively smaller amounts each year. It is assumed under this method that an asset will never be entirely written off until it is finally discarded, but that a constant percentage, 1/m th, of what is left at the beginning of each year will be used during the year. Thus in the first year depreciation will be $(m-1)/m$ and so the depreciation in the second year will be $(m-1)/m^2$; the amount left at the end of the second year will be $(\frac{m-1}{m})^2$, and so on, until the asset is sold or scrapped.[26] The basic argument for the reducing balance method is that it corresponds to what seems to be the common life pattern of assets where a relatively sharp decline in value to the owner occurs during the early years of life.[27] It is further argued that this method avoids the abrupt change at the end of the assumed average life, from a constant depreciation charge to no charge which is inherent in the straight-line method. However, this is a minor defect of the straight-line method in aggregative analysis, because of the averaging effect of using different average lives for

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25. Grant and Norton, op. cit., p.88.
26. Feinstein, Capital Formation in the U.K., op. cit., p.3.
27. Denison, Theoretical Aspects of Quality Change, op. cit., pp. 250-251.

numerous types of goods. In these respects, the reducing balance method is less sensitive than the straight-line method to moderate changes in the average lives utilized.[28]

Depreciation is defined in the present study in such a comprehensive sense as to include allowances for wear and tear, obsolescence and accidental damage. The straight-line method is adopted in view of: (a) its simplicity, and (b) the fact that it is the method used currently in Egypt's national accounts. The rates at which depreciable assets were written off and their implied lengths of life were also decided by reference to national accounting practices. No allowance is made, however, for depreciation for works of irrigation and drainage as these are kept almost intact through constant expenditure on maintenance. This treatment raises the more complex aspect of depreciation concerning assets which do not have a normal life-cycle and which are, in a sense, permanently maintained in their original condition. This is particularly important when measuring NFCF in assets like dams, barrages and irrigation canals. According to C. Feinstein, these assets are characterized by "the absence, in many cases, of anything which seems to constitute the 'scrapping' and 'replacement' which would normally bring the life history to a close. Instead, we seem to be faced with a situation in which maintenance is clearly necessary, but in which (at least if we take a broad view of 'maintenance') the asset seems to be everlasting".[29] A possible way of dealing with these assets is to exclude from C.F. all expenditure on maintenance (including not only repairs but also renewals) and, at the same time, not to allow for depreciation which would result in

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28. Denison, Theoretical Aspects of Quality Change, op. cit.,p.251.

29. For a detailed discussion of this case see Feinstein, Domestic Capital Formation in the U.K., op. cit., Appendix 1.1, pp.7-10.

the C.S. series showing continuously uniform figures for the depreciated and the first cost value. The assumption made is thus, in effect, that current expenditure maintains the economic life of the asset and thereby gives it an essentially permanent character. Feinstein regards this treatment as "rather artificial" on the grounds that complete renewals should be capitalized and that the view that the whole asset is everlasting takes no account of obsolescence and that these assets usually contain short-lived items.[30] He suggests that distinction should be made between that part of expenditure on repairs and renewals likely to prolong the asset's life or increase its efficiency and which should be treated as gross investment, and routine maintenance. In this case, the asset should be depreciated in the normal way assuming an arbitrarily long life such as 100 years.[31] However, as we will see in the case of the irrigation works in Egypt, it might be extremely difficult to distinguish between maintenance and renewal or improvement in which case there would be no alternative but to apply the crude method despite its obvious shortcomings.

Finally, wherever allowance was made for depreciation, net investment was derived according to the following identity:

> "Net investment during the year equals gross investment during the year less Depreciation during the year".[32]

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30. Feinstein, Domestic Capital Formation..., op. cit., Appendix 1.1, p.9.
31. Ibid., pp.9-10.
32. After Feinstein's identity (5); Ibid., p.4.

1.4 Gross and Net Capital Stock

The commonest measures of fixed capital stock are the gross (or undepreciated) stock, sometimes called the first cost value, and the net (or depreciated) stock.[33] The gross stock is measured by cumulating gross fixed capital formation, and deducting cumulated retirements, all at constant prices, and the net stock by cumulating gross fixed capital formation, and deducting cumulated depreciation, that is, by cumulating net fixed capital formation, again all at constant prices. If an asset is assumed to have a constant life of L years, retirements are defined to be investment L years previously; in other words an asset is kept in the gross stock at its full value until its life is deemed to have ended, when it is suddenly removed. This contrasts with the case of the net stock where an asset is depreciated throughout its lifetime, that is, it is gradually removed from the stock.

Algebraically the gross fixed capital stock (GFCS) is defined as follows:

$$G_n = G_{n-1} + I_n - S_n$$

where: G_n = GFCS at the end of the year n

G_{n-1} = GFCS at the end of the previous year

I_n = Gross investment in year n

S_n = value of assets retired or scrapped in year n

and all variables are expressed in terms of constant prices.

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33. On the alternative concepts of capital stock see; Vernon Smith, "The Measurement of Capital", in Measuring the Nation's Wealth, Studies in Income and Wealth, Vol.29, Washington, 1964, pp.331-6, and Feinstein, op. cit., pp.5-6.

In the absence of any data on the actual value of assets retired, it has been assumed in this study that they are retired at the end of their constant lives, and that they have a zero scrap value at their retirement.[34] Estimates of the length of life of different assets were based on accounting practices regarding depreciation. Some assets (dams, barrages..., etc.) were assumed to have been permanently maintained in their original condition and were therefore never discarded.

Net fixed capital stock (NFCS) was calculated according to Feinstein's identity (1) where:

> "Depreciated value of Stock at end of year equals Depreciated Stock at the beginning of year plus Gross investment during the year less Depreciation during the year".[35]

Put formally: $N_n = N_{n-1} + I_n - D_n$

where: N = NFCS

I = Gross investment

D = Depreciation, and all were measured at constant 1960 prices.

According to the straight-line method adopted here:

$$D_n = \frac{1}{L} \cdot G_n$$

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34. One of the major criticisms of the constant length of life assumption implied by this method, is its obvious arbitrariness. The actual life of the asset is very likely to be affected by unforseeable developments. Technical innovations may make the assets obsolescent before their estimated lives are over. Conversely, the assets may turn out to be both economically and technically useable for some years after they have been completely written off. See Feinstein, Capital formation in the U.K., op. cit., p.4.

35. Ibid., p.2.

where: D_n = Depreciation

L = length of life of the asset

G_n = GFCS

In order to start off either of these identities for extimating capital stock, an initial capital stock estimates must be made. This problem is considered later in this section.

Conceptually, the gross stock measure accords with the idea of the capacity of the stock irrespective of age and quality differences. On the other hand, the net measure accords not so much with the current capacity of the stock as with the total expected future life.[36] Net stock is less than gross stock because used capital goods command a smaller market value than new ones. This is usually attributed to (a) deterioration; used capital goods may be less productive than new goods of the same technology, and, (b) exhaustion of economic life; used capital goods have fewer productive years available because of declining productivity and the rising threat of economic displacement due to technological improvements which cannot be embodied in existing assets.[37]

The controversy concerning the preference of one over the other of the two measures does not concern us here, since each estimate is appropriate for a certain purpose.[38] As Gaathon puts it, "The preference for gross over net capital is justified when the contribution of capital to current output is measured. For the longer-term view, it is the aggregate of

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36. Feinstein, Capital Formation in the U.K., op. cit., p.5.
37. Vernon Smith, op. cit., p.333.
38. For a summary of this controversy see; Creamer, Measuring Capital Input..., op. cit., pp.62-66.

capital services still unspent, rather than their current output, that is relevant, and the net concept is therefore the appropriate one. In other words, while over a fairly short period it is meaningful to compare output with capital input measured as a function of all assets still alive, over a longer period the capacity of the stock, measured by its life expectation, becomes relevant."[39]

The initial capital stock of various assets was measured, in the present study, in one of the following two ways:

1. In the case of industrial machinery and buildings, the value of the initial stock for each type of asset was obtained by cumulating the capital expenditure on that asset for L years where L is equal to the length of its assumed useful life. Gross expenditures were used in the estimation of the gross stock and net expenditures, equal to gross expenditures less depreciation, in the calculation of the net stock.[40] The major disadvantages of this method are: (a) that it is greatly sensitive to assumptions about the actual length of life of each type of asset -- assumptions which are themselves arbitrary; and (b) that it requires the preparation of estimates of gross investment, and appropriate price deflators for a period dating back to the mid-19th Century where data are very inadequate.

2. An alternative method of estimating initial capital stock is from a census of capital items, where all assets are reported on a uniform bases, at a given time. Thus in the case of "Irrigation and Drainage" initial capital stock was

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39. Quoted by Creamer, op. cit., p.65.

40. Raymond W. Goldsmith, "A Perpetual Inventory of National Wealth", Studies in Income and Wealth, vol.14, N.B.E.R., New York, 1951; and also The National Wealth of United States..., op. cit., pp.10-13.

based on a comprehensive survey of all the irrigation works in Egypt in 1912, and in the case of "Rural Dwellings" and "Agricultural Tools and Implements", the estimate was calculated from physical inventories of various assets reported by country-wide Censuses and valued at 1960 prices.

Finally, no adjustment is made in the present estimates of capital stock to allow for variations in capacity utilization on the grounds that; (a) the degree of utilization is an aspect of efficiency, and interesting as such, but our main concern here is with the measurement of capital capacity; and (b) the absence of any data on capacity utilization in Egypt.

CHAPTER TWO

CAPITAL FORMATION IN EGYPTIAN AGRICULTURE, 1882 - 1967

2.1 Introduction

The purpose of this chapter is to estimate C.F. in the agricultural sector over the period 1882-1967. The first problem is one of definition. Generally speaking, C.F. represents a measure of diversions from current product (and imports) for addition to capital stock available for future production. As is often the case in national income analysis, attempts to define the empirical equivalents of such economic concepts bring to light unforseen complications and borderline cases which must be decided on the basis of expediency or by simple convention.[1] It is obvious, therefore, that in such cases different answers may be possible depending on the purpose for which the figures will be used. In view of the nature of Egyptian agriculture and data available, I found it appropriate tofollow the definition suggested by the U.N. System of National Accounts.[2] According to this definition, F.C.F. represents additions to fixed assets and is made up of the outlays of producers on commodities which do not enter into the intermediate consumption of the accounting period. The fundamental distinction between intermediate consumption and C.F. is whether commodities are considered to be used up in the period of account or to yield benefits in the future. Thus, for instance an outlay on fertilizers or pesticides is not included in F.C.F. Similarly, non-reproducible tangible assets such as

1. U.N., Concepts and Definitions of Capital Formation, Statistical Papers, Series F, No. 3, N.Y., 1953, p.9.
2. U.N., A System of National Accounts, Studies in Methods, Series F, No. 2, Rev.3, N.Y., 1968, Table 6.3, pp.114-115.

land and natural growth of standing timber or crops, are not included in C.F., just as these assets are excluded from the supply of commodities. Also, outlays from which benefits may accrue in the future but which are not embodied in tangible assets (expenditure on research and education) are to be excluded.

The composition of F.C.F. in agriculture suggested by the above definition, and upon which my estimate is based, will be as follows:

i. Irrigation and drainage works.

ii. Rural dwellings and farm buildings.

iii. Livestock.

iv. Machinery, tools and implements.

Land is not considered as capital. The rents and prices of agricultural land depend entirely on buyers' and sellers' estimates of the net product of what can now and in the future be obtained from it, taken in conjunction with their estimates of alternative means of earning a living or of investing money.[3] Capital, in the present definition, consists only of those requirements for agricultural production which are produced by human effort, and which (at any rate at the time that investment is made, though their value might change during their lifetime) have a definite purchase price or cost of construction. Nevertheless, all durable improvements to land such as drainage, irrigation, clearing of forests, grading, etc., are included in C.F. of the period when these improvements were made.

Finally, no attempt is made in this study to estimate working capital (fertilizers, seeds, fodder, pesticides and fuel). With the exception of fertilizers, data on these inputs does not exist for any year before 1950. However, in Chapter 4, available data

3. Colin Clark, Capital Requirements in Agriculture - An International Comparison, Mimeographed Paper, Agricultural Economic Research Institute, Oxford, January 1967.

will be used to assess the importance of working capital for agricultural growth in the course of development. But now we turn to the subject matter of this chapter; the measurement of the different components of F.C.F.

2.2 Capital Formation in Irrigation and Drainage

The first component of agricultural C.F. is investment in irrigation and drainage. The inclusion of these inputs need hardly be justified. As pointed out in the preceding section, and according to the U.N. manual on "Concepts and definitions of Capital Formation", all durable improvements to land such as irrigation and drainage etc., should be included in C.F.[4] Moreover, investment in those inputs represent a necessary precondition for the cultivation of land especially in a country like Egypt where agriculture depends almost exclusively on artificial irrigation from the Nile. Under such conditions, the supply of land, and consequently the growth of agricultural output, are mainly determined by water supply. This point is clearly illustrated by Herodotus' frequently quoted dictum that Egypt is "the gift of the Nile". It is no exaggeration to maintain that the history of the country is greatly the story of the use man made of the Nile; his efforts to control flood and fight drought. The outcome of this process is one of the oldest civilizations with a highly developed system of irrigation as one of its main achievements.

This section will start with a brief résumé of the history and development of Egypt's irrigation system to give an idea about the structure of this sophisticated complex and provide a frame of reference that puts into perspective the methods used to measure capital formation.

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4. U.N., Concepts and definitions of Capital Formation, op.cit., p.11.

2.2.1. The Irrigation System of Egypt; Brief History and Development

The 19th Century witnessed the beginning of a revolutionary change in Egypt's irrigation system. Until then the ancient system of "Basin Irrigation" was still the basis of the agricultural organization of the country. Under this system the cultivable land was divided into a number of large basins surrounded by banks of earth. During the flood, at the end of the summer, the basins were innundated with water for about 5-6 weeks. When the flood had abated, any water remaining in the basins would be allowed to drain away into the Nile leaving the land covered with a layer of rich fertilizing deposit upon which peasants sowed their seeds.[5] The basin soil retained sufficient water to provide for the needs of winter crops only (wheat, barley, beans, clover, flax, tobacco and lettuce). But during the spring and early summer the basin lands stood parched and uncultivated and crops like maize, sugar cane and indigo were limited to comparatively small areas of land near the river or wells. The principal commercial product of the country under this system, for thousands of years, was wheat. The people fed themselves on maize and used the wheat to pay their taxes. In good years there was a surplus for export.[6] The basin system had many advantages most important of which was the maintenance of the traditional fertility of Egypt's land. But, on the other hand, it allowed the cultivation of only one crop a year and the success of this crop depended entirely upon the height of the Nile flood.

5. W. Willcocks and J.I. Craig, Egyptian Irrigation, 3rd. ed. Vol I, London 1913, Chapters IV and V, pp.299-366 and H. Serry, Irrigation in Egypt: A Brief Résumé of its History and Development, Egypt, Ministry of Public Works, Cairo 1937, p.9-11.

6. A.E.Crouchley, "A Century of Economic Development, 1837-1937: A Study in Population and Production in Egypt", L'Egypte Contemporaine, March 1939, p.137-8.

When, as happened from time to time, the flood was seriously below normal, many of the higher basins were not inundated and could not be cultivated and "a black year of misery and famine inevitably followed".[7]

Since the beginning of the 19th Century until now, the basin system has been gruadually replaced in all parts of the country by a modern system of infinite complexity which has made Egypt practically independent of Nile fluctuations and, at the same time, made it possible to cultivate the land all the year round. This is the system of "perennial Irrigation".[8] This system was inaugurated by Mohammed Ali (1805-1849). The introduction of summer crops in 1816 and particularly of cotton in 1820, necessitated a radical change in the irrigation system involving the provision of water in summer and spring. The Delta was covered by a network of canals deep enough to supply the whole area with summer water. Nevertheless, water in the canals was far below the level of the land and had to be lifted to the fields by the "Shadouf", water lift, or "Sakia", water-wheel.[9] To get over this difficulty, temporary barrages were built across the canals in the Delta to hold back the water and so raise its level. However, the digging of these canals, their clearance and the building of barrages proved to be an enormous undertaking for a country of about 3 million population a large number of whose

7. Ibid., p.138.
8. Willcocks and Craig, op.cit., Chapters VI and VII, pp.366-448.
9. A.E. Crouchley, The Economic Development of Modern Egypt, London 1938, p.55. The process of annual canal clearance was very expensive. M. Linant, the French adviser on irrigation, wrote in his memoires that "the excavation of the grand summer canals necessitated the removal of 110 million m3. of earthwork representing an expenditure of £E3.3m." nearly asmuch as the cost of the Delta Barrages, £E4m. Willcocks reported that the building of the Delta Barrages reducedthis expenditure by 50%; Willcocks and Craig, op.cit., p.372.

adult males were away in the army, navy or the factories of the Pasha.[10] Every year, an army of fellaheen were taken away from villages to work for the government under the notorious system of "Corvée", or forced labour. According to Crouchley, after 1825, "355,000 men were employed for 4 months every year in cleaning out the canals and other irrigation works".[11] To reduce this enormous waste of labour, Mohamed Ali approved in 1842 of a plan by M. Linant, his French adviser, to build the Delta Barrage at the bifurcation of the Nile north of Cairo. But work stopped after the Pasha's death and it was not completed before 1861. But due to basic difficiencies in the structure of the Barrage it led a very precarious life requiring continual annual repairs until it was completely renewed in 1934-39.[12]

The building of the Delta Barrage marked the first stage of the perennial system of irrigation. The development of the cotton economy and Egypt's integration, as an agricultural unit, in the world-wide economic system, necessitated a vast expansion of the irrigated area. By the end of 19th century, the country was faced with three major problems in developing the irrigation system; a) the expansion of the canal network to carry summer water to areas further away from the Nile, b) to solve the problem of flood-water storage for use in summer by building barrages and reservoirs and c) to remedy the problem of rising subsoil water levels by developing a good system of drainage.

The extensive efforts of successive governments to deal with these problems delineate the history of irrigation in Egypt during

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10. Ibid., p.54.
11. Ibid., p.55.
12. The major benefit of the Barrage was the increase in the cultivated area in the Delta from 2m. feddans in 1843 to 3m. in the 1860's; J. Barois, Les Irrigations En Egypte, 2nd ed., Paris, 1911, p.168.

the period 1882-1967. Developments in these three directions could be summarized as follows:

a. Canals

As early as the beginning of the 20th century, Egypt was covered by a large network of irrigation canals. In 1904 there was 9,542 kilometers of irrigation canals serving an area of 4.6 million feddans in Lower Egypt (i.e. 2 meters per feddan).[13] By 1912 canals increased to 15,000 kilometers insuring perennial irrigation to an area of 4.1 million feddans (i.e. about 3.7 meters per acre).[14]

The Delta was served by the two branches of the Nile, Damietta and Rosetta, and a large number of canals (see map on p. 29) It was divided into 3 parts:

i) Eastern: including the Kaliobia, Sharkia, and Dakahlia provinces (1.2m. feddans). This was served by four canals taking from the Nile, namely Ismailia (136km)., Sharkawia (30 km.), Bessoussia (24km.), and Rayah Tawfiki (65 km.),

ii) Central: including the Menufia and Gharhia provinces (1.3m. feddans) and served by the Rayah Menufi (23km.), Bahr Shebein (173km.), Bagouria (147km.), and Rayah Abbas (10km.),

iii) Western: including Beheira province (0.6m. feddans) and served by Khatatba (123km.), Mahmoudia (77,5km.) and Rayah Beheira (41km.)

As for Middle Egypt (including the Asuit, Minia, Beni Suef, Fayoum and Giza provinces), a large canal, Ibrahimia, perhaps the largest artificial canal in the world (61km.) and its subsidiary,

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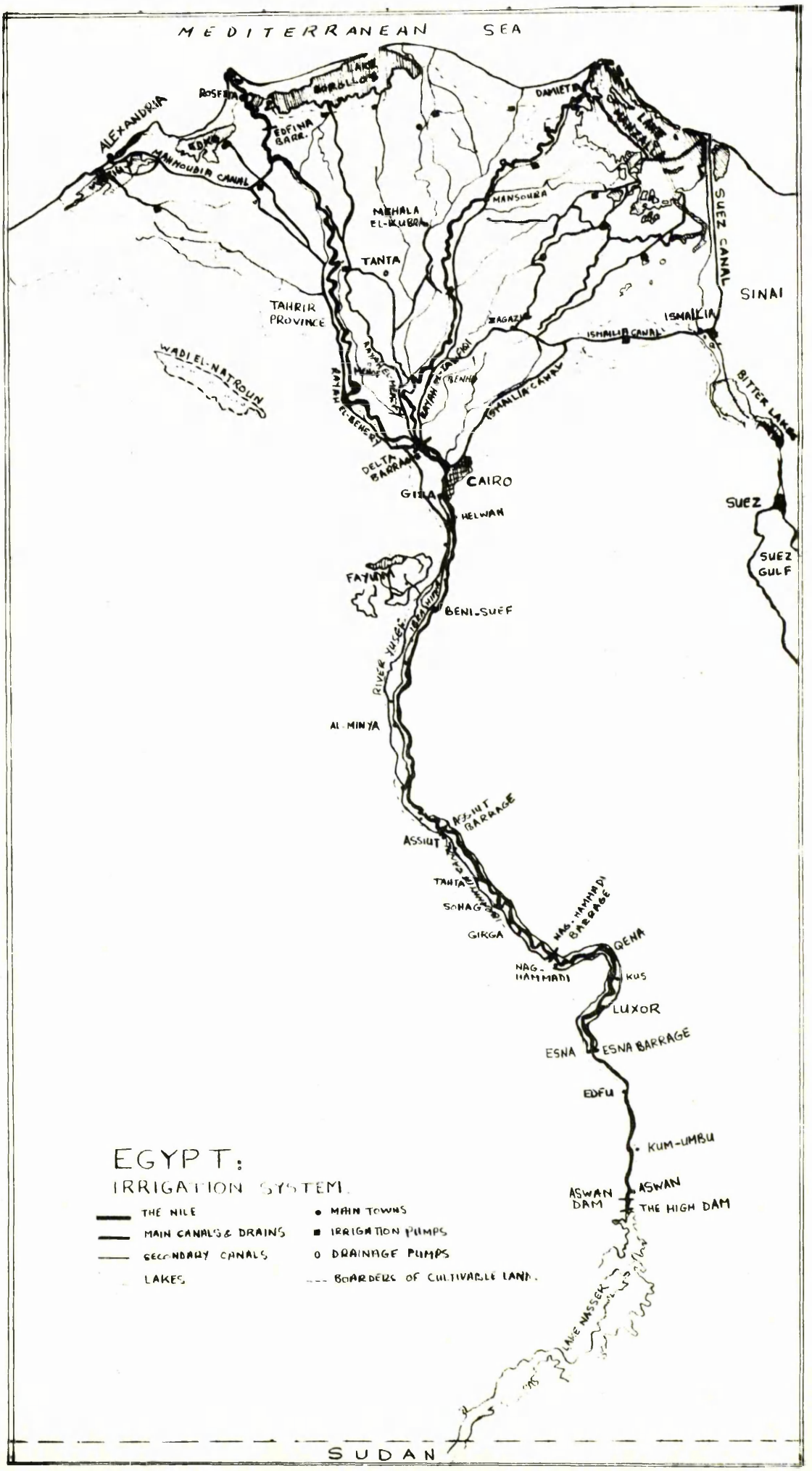
13. Ibid., p.179.
14. Willcocks and Craig op.cit., p.436.


MEDITERRANEAN SEA
ALEXANDRIA
ROSETTA
BURULLOS
LAKE
EDFINA BARR.
EDKU
MAHMOUDIA CANAL
DAMIETTA
LAKE MANZALA
MEHALA EL-KUBRA
MANSOURA
TANTA
SUEZ CANAL
SINAI
TAHRIR PROVINCE
ZAGAZIG
ISMAILIA
ISMAILIA CANAL
WADI EL-NATROUN
RAYAH EL-BEHERY
RAYAH EL-MENOUFY
RAYAH EL-BENHA
BITTER LAKES
DELTA BARRAGE
CAIRO
GIZA
HELWAN
SUEZ
SUEZ GULF
FAYUM
BENI-SUEF
RIVER YUSEF
AL-MINYA
ASSIUT BARRAGE
ASSIUT
TAHTA
SOHAG
GIRGA
NAG-HAMMADI BARRAGE
QENA
NAG-HAMMADI
KUS
LUXOR
ESNA
ESNA BARRAGE
EDFU
KUM-UMBU
ASWAN DAM
ASWAN
THE HIGH DAM
LAKE NASSER
SUDAN
EGYPT:
IRRIGATION SYSTEM.
THE NILE
MAIN CANALS & DRAINS
SECONDARY CANALS
LAKES
MAIN TOWNS
IRRIGATION PUMPS
DRAINAGE PUMPS
BOARDERS OF CULTIVABLE LAND.

Bahr Yousef (276km.) were constructed to irrigate the Khedive sugar and cotton plantations. They served an area of 1.7m. feddans.[15]

This network of canals however large and efficient did not insure flush irrigation all the year or to higher lands. The fellah had to use a number of tools to lift the water to his land such as the "Sakia", water wheel, the "Shadouf", water-lift, and the "Tambour", Archimedes screw,[16] Mechanical irrigation pumps were used by government and big firms to irrigate their domains. Just before the 2nd world war (1938) there was about 300,000 H.P. of irrigation machines in Egypt.

It is interesting to notice that a great number of these canals are not exclusively for irrigation but they also serve other economic activities, especially transport. Their banks make up an extensive network of narrow roads known as "Agricultural Roads" as they provided a link between villages and markets of nearby towns. Also many of those canals (and large drains) are navigable and interconnected and provide a good system of inland waterways.[17] Barois reported the existence, as early as 1911, of four routes from Cairo; one to Alexandria, one to the Mediterranean, one to Lake Manzala and one to Ismailia.[18]

b. Dams and Barrages

With the expansion of perennial irrigation more land came under cultivation in summer. This called for irrigation during a period of the year when the Nile supply is low and it was necessary for those concerned with agricultural development to consider the amount of water required by the summer areas during each phase of

15. J. Barois, op.cit., pp.144-167.
16. J. Besangon, L'Homme et le Nil, Paris, 1957.
17. H. Serry, Irrigation in Egypt, op.cit., p.14.
18. J. Barois, op.cit., p.179.

of progress; this raised the question of storage. Barrages needed to be built to help raise the water level in canals especially during summer when the level of water in the rivers is low.

Before the Delta Barrage, the Government used to build temporary barrages every year to raise the water in the Damietta and Rosetta branches during summer. These were swept away by flood water later. This was a costly and inefficient way of storage.[19] The construction of the Delta Barrage at the heads of the two branches of the Nile marked the beginning of a permanent solution to the problem of storage. The first decade of the 20th century witnessed a continuous and consistent effort in controlling the Nile water. As an indication of the magnitude of this effort we now discuss the dams and barrages on the Nile and their impact on agricultural development in Egypt.

i. The Aswan Barrage:

In 1884, Sir William Willcocks proposed the building of a barrage across the Nile at Aswan 946 kilometers far from the Delta head. The purpose was to increase the supply of summer water needed for perennial irrigation by holding back the tail of the flood for use in the following summer.

Construction started in 1889 and was completed in 1902. In response to increasing demand for summer water especially for cotton, the Barrage was twice heightened, once in 1912 and again in 1933.

The direct benefit of the Aswan Barrage was that the Delta came under perennial irrigation completely. This was reflected by an increase in the cultivated area, andin the production and export of the country's cash crop, cotton.

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19. Two kinds of temporary dams were used; stone dams on the Damiett Branch at a cost of £.E. 5000, or earthen dams on the Damietta Branch at the cost of £.E.6,500 and on the Rosetta Branch at the cost of £.E.10,500. Willcocks, & Craig, op.cit., p.632.

The most important indirect benefit was the construction of the hydro-electric power station at Aswan which remained the main supplier of the country's electric power until the building of the High Dam.

ii. The Assiut Barrage:

The Assiut Barrage was built across the Nile near the town of Assiut, 546 kilometers from Aswan and 419 kilometers from the Delta Barrage.

The Barrage, which was completed at the same time as the Aswan Barrage (1902), was intended to insure Middle Egypt the necessary share of the Aswan Reservoir water in summer for the conversion of this area to perennial irrigation like the Delta. It was built at the head of the Ibrahimia Canal which had been primarily designed to provide perennial irrigation to the sugar estates of Ismail Pasha.

In 1934-38, the Assiut Barrage was remodelled to meet the new conditions following the increased storage of the Aswan Barrage.

iii. The Zifta Barrage:

This barrage was built in 1903 at Zifta on the Damietta Branch 87 kilometers downstream from the Delta Barrage. Its purpose was to give a new point of supply from the river to Menufia and Tawfikia canals feeding the north eastern part of the Delta (Northern Dakahlia and eastern Gharbia). The capacity of this barrage was increased by subsidiary works in 1905-7.

iv. The Esna Barrage:

In order to improve the basin irrigation of the Qena Province during flood it was decided to build this barrage across the Nile

immediately north of Esna town, 160km. north of Aswan Barrage. Construction started in 1906 and was completed in 1908.

Crouchley reported that at this stage the "immediate irrigation projects by the government were completed. Lower and Middle Egypt had been successfully converted to perennial irrigation; a barrage (Esna) had been provided to regulate the filling of the basins in Upper Egypt, and a large storage reservoir at Aswan had been constructed to supply the summer water required in the area under perennial irrigation".[20]

v. The Nag-Hammadi Barrage:

The barrage built between 1928-30 spans the Nile 588km. south of Cairo and 354km. north of Aswan. Its purpose was to complete the conversion of Middle Egypt basins into perennial irrigation. This was to be achieved by raising the flood levels in canals to insure full supply to the basins depending on it during low flood. This completed, the basins in Cirga and Assiut were converted to perennial irrigation.

vi. The Edfina Barrage:

To raise the level of water at that part of the Delta the Government used to construct temporary barrages every year across the Nile at Edfina and Farescour. In 1936 a plan was made to construct a permanent barrage at Edfina, but the project had to be stopped because of the war and it was completed in 1951.

vii. The Gebel El-Aulia Dam:

In the 1930's two dams were built in Sudan to store additional flood water as it was impossible to heighten the Aswan Dam for a third time. The first was the Sennar Dam on the Blue Nile. This

20. A.E. Crouchley, The Economic Development of Modern Egypt, op.cit., p.152.

project does not concern us as its waters were used mainly to provide water for Gazira cotton farms. It is the second project, the Gebel El-Aulia Dam that concerns us. Though it is not on Egyptian territory it represents an investment overseas of direct benefit to domestic production and it was the Egyptian government that paid for its construction including compensation for the riverain people in the Sudan.

Gebel El-Aulia Dam was built in 1934 at the confluence of the Blue and the White Niles just below Khartoum. This Dam completed, Egypt was sure of its needs of summer water for at least three decades, until 1960's after which Egypt had to face a new problem; the provision of a century-storage dam.

c. Drainage

The third problem Egypt had to deal with was the problem of draining subsoil water. The introduction and extension of perennial irrigation and the consequent watering of land throughout the year have led, in the course of time, to the deterioration of the soil. In spite of the remarkable effort to complete the irrigation system, it was noted that productivity of Egyptian agriculture started to decline after 1903.[21] This decline was mainly due to the failure of drainage to keep pace with the increased water supply. (other reasons being exhaustion of the land due to overcropping and attacks of insects, especially cotton worm).

The remedy for the increase in subsoil water level was for the government to undertake large-scale drainage operations so that surplus water would flow into drains running towards the northern end of the Delta below the level of the land. The water from these drains would be emptied into the northern lakes or the sea by great pumps.

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21. Ibid., p.159.

It was in 1896 that resources were made available to the Ministry of Public Works for the expansion of drainage, and expenditure on drainage increased from £E.38,000 for 200km. of drains in 1885-1895 to £E.1.4m. for 3,387km. of drains in 1897-1907. This effort went on uninterrupted except by the war.

In 1913 work started on the Western Behera drains discharging by the Mex pumping station and the Central Gharbia drains discharging by Baltim pumping station, but was stopped because of the war.

After the 1st World War, work was resumed on a larger scale. The Delta was divided into 3 drainage areas of about 1 million feddans each. Drains were dug and pumping stations installed. The same effort extended to Middle and Upper Egypt. By 1939, about 10,000km. of drains had been dug and at least 18 pumping stations operated by electricity provided from 3 power stations.

By the beginning of the 1950's Egypt's dependence on agriculture had not decreased. Once again the government had to grapple with the same old problems of irrigation and drainage. A remarkable effort was made primarily in three areas:

i) Irrigation; solving the long-term storage problem by building the High Dam, south of Aswan Barrage. This project completed in 1970 is to convert the last 1m. feddans of Egypt's basins to perennial irrigation, to provide water for rice plantations (700,000 feddans) and to generate electricity needed for the industrialization of the country.

ii) Drainage; the project of "covered drains" which provided cemented underground canals passing under the fields and receiving their excess water by means of wells at certain distances. These canals run to the public drain where they discharge their water.

iii) Land reclamation; to reclaim parts of the vast desert in response to the rapid population growth in Egypt. There have been various projects, the most important of which was the Tahrir Province in Western Delta, the New Valley in Upper Egypt, and the Kattarah Depression in the north west desert.

Investment figures provide a general indicator of these developments. Between 1952 and 1967 investment has increased from £E. 13.7 m. to £E. 82m. for "Agriculture" (i.e. by 485%), and from £E. 6.8m. to £E. 60m. for "Irrigation, Drainage and the High Dam" (i.e. by 457%)[22]

After the above brief resume of the history and development of the irrigation system of Egypt, an attempt is now made to estimate capital formation in this vital field.

2.2.2. Computation of Fixed Capital Formation in Irrigation and Drainage.

Data are not available to make possible an estimate of capital formation in irrigation and drainage using the physical, or commodity-flow, approach. Therefore we resort to expenditure, or flow-of-funds, approach.[23]

The starting point was to construct a series of gross fixed investment based on the government annual expenditure (at current prices) on investment in irrigation and drainage for the period 1882-1967. This series includes actual outlay by the government for "NEW WORKS" only and excludes expenditure on maintenance. Though sources vary over this period, that does not affect the comparability and consistency of the data. For the

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22. Ministry of National Planning, Follow-up Report of the 5-Year Plan, 1959/60 - 1964/65, Cairo 1966 and Follow-up Report for the Years 1964/65 - 1966/67, Cairo 1968.

23. See Chapter 1, Section 1.1.

period 1882-1895 figures were taken from the Egyptian Government Statistical Returns: 1880-1904, Cairo 1906.

From 1895-1952 we have three sources:

i) Egypt, Ministry of Public Works, "Annual Reports", previously called "Irrigation Reports". This is a valuable source for detailed account of all the projects and expenditures that took place during each year. The figures quoted here come under the heading "Irrigation and drainage: New Works".

ii) Egypt, Ministry of Finance, Final Accounts. This invaluable source gives a detailed account of the Government's finance as it actually happened during each year. Figures quoted here come under the same heading as the "Annual Report" and they report the same figures.

iii) Egypt, Annuaire Statistique, 1909-1964.

Finally, the period 1952-1967; figures are taken from two sources:

i) for 1952-1967; Department of Statistics and Census, Statistical Atlas, Cairo, July 1962.

ii) for 1959-67; Ministry of National Planning, Follow-up Report of the 5-Year Plan, 1959/60 - 1964/65, Cairo, 1966, and The Follow-up Report for the Years 1965/66 - 1966/67, Cairo 1968.

The two sources give figures of actual Government expenditure on investment in "Irrigation, Drainage, and the High Dam" at current prices.

It should be pointed out, however, that figures obtained from these sources represent C.F. by the Government and therefore might suffer from a downward bias due to the neglect of investment made by the private sector. In Egypt, farmers, especially on big holdings have to divide their plots into basins and to dig

small irrigation canals and drains which connect their fields with main canals and drains. Conceptually, a certain value should be imputed to account for these activities. But practically this has proved to be a difficult task. Moreover, our results are not likely to be seriously affected for the following reasons; first, it emerges clearly from the historical outline in the previous section that in Egypt, the central government has been almost entirely responsible for the provision, expansion and maintenance of the country's hydraulic system. Secondly, farmers' efforts to build basins and dig small canals on the field, though entailing a high input of labour, are not of a permanent nature. They should be considered as current cost, rather than fixed capital formation, since the land had to be levelled after each harvest and prepared again for the new crop.

The second step in estimating C.F. in irrigation and drainage was to express the series of fixed investment in terms of constant prices by using an appropriate deflator. The one used in this study is a weighted average of three price indices (Appendix Table A-1):

i) An agricultural money-wage index; to account for the contribution of domestic labour engaged in the construction of irrigation works. For the period up to 1914 for which no wage index is available, I used the wholesale price index provided by M. El-Darwish.[24] As for the rest

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24. M. El Darwish, A New Series of Index-Numbers of Wholesale Prices in Egypt, 1899-1929, Ministry of Finance Cairo 1931. The index covered 23 commodities, mainly consumer goods. The use of the wholesale price index as an indicator of changes in wages implies the assumption that workers' earnings were entirely spent on wage-goods which appears plausible for the wage-earners in poor agriculture. Moreover, this index, when applied to wage data available after 1914, indicated a 1.5 piasters as wage per day at the beginning of the period which was the average wage rate for agricultural workers at the time; see Charles Issawi, Egypt: An Economic and Social Analysis, London 1947, p.80.

of the period, I used B. Hansen's Money-Wage Index in Agriculture.[25] Since Hansen's index covers the period up to 1960 only, it was extended to 1967 on the basis that daily agricultural wage amounted to 12 piasters in 1960, 18 piasters in 1965 and 25 piasters in 1967.[26]

ii) Price index of building materials; to account for the cost of building materials used in the construction of irrigation works. For the period 1882-1937, I used a unit value index of U.K. exports of cement[27], and for the rest of the period (1937-1967), Egypt's wholesale price index of building materials.[28]

iii) Price index of metals; to provide for changes in the cost of metals and metallic structures used particularly in dams and barrages. As in the case of building materials, this index was based on the unit value of U.K. exports of iron and steel for the period 1882-1937, and the domestic wholesale price index of metals for 1937-1967.[29]

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25. B. Hansen, "Marginal Productivity Wage Theory and Subsistence Wage Theory in Egyptian Agriculture", Journal of Development Studies, Vol.2, No.4, July 1966, Table III, p.405.

26. B. Hansen, "Employment and Wages in Rural Egypt", American Economic Review, June 1969, pp.306-11.

27. I based this index on the average price of cement exports from the U.K. as reported in the Statistical Abstract of the U.K. The use of this index is justified on the grounds that: a) though domestic production of building materials started in Egypt as early as the 1890's, imports remained the main source of supply; and b) Britain was by far the major exporter to Egypt of such goods.

28. National Bank of Egypt, Economic Bulletin, various issues. This index is a weighted average of the wholesale prices of building materials especially cement and bricks.

29. Data on the average price of U.K. exports of iron and steel for 1882-1920 were obtained by dividing annual values of such exports (B.R. Mitchell and P. Deane, Abstract of British Historical Statistics, Cambridge, 1962, Table 8, pp.304-6) by their volume (Werner Schlote, British Overseas Trade From 1700 to the 1930's, Oxford, 1952, Table 16, pp.153-4). For 1920-26 the same procedure was applied to data from the Statistical Abstract of the U.K.. For 1926-37 the average price index of U.K. exports of Iron and Steel and Manufactures published by the Board of Trade Journal was used. Finally, Egypt's wholesale price index of metals (1937-68) is that published by the National Bank of Egypt, Economic Bulletin, various issues.

The weights given to the above components of the deflator were based on my assessment of the relative shares of labour, construction, and equipment in the total cost of the different irrigation and drainage works carried out during the different phases of development of Egypt's irrigation system. The period of study was, therefore, divided into four subperiods during which weights were changed as follows: (percentages)

Period	Wages	Building Materials	Metals
i. 1882-1913	62	31	7
ii. 1913-1930	70	24	6
iii. 1930-1959	62	31	7
iv. 1959-1967	60	25	15

Weights in period (i) were based on a detailed analysis of the value of irrigation works that made up the initial stock in 1912.[30] GFCS at the end of that year amounted to £E.30.3m (at current prices), of which 54% were canals and drains, and 46% dams and barrages. The share of canals and drains was assumed to be represented entirely by wages in view of the highly labour-intensive techniques (manual excavation) used until recently in constructing these works.[31] Moreover, the 46% share of dams and barrages were divided among wages (17%), building materials (67%) and metals (16%) on the basis of a detailed breakdown

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30. See p. below. The use of Stock figures to indicate the composition of investment is not likely to impart serious biases since almost all the works that constituted that Stock were concentrated around the first decade of the 20th Century. Any depreciation excluded from the 1912 Stock figures would not have been large enough to invalidate inferences about the composition of investment.

31. J. Barpis, Les Irrigation en Egypte, op. cit., pp.284-313. It appears very clearly from Barois' account on major canals that the greater part of cost was paid to workers for excavation work.

of the costs of the main works built on the Nile during that period.[32]

The same weights were also used for period (iii) for which no detailed accounts were found. We believe that these weights are not unrealistic since a) period (iii), like (i), was characterized by large investment in dams and barrages, and b) there is no evidence of a radical change in the techniques of constructing irrigation works in Egypt between the two periods.

Weights for the secomd period (1913-1930), were based on a breakdown of actual investment in irrigation and drainage for the year 1925-26, the only year for which detailed accounts are available. However, this year can be regarded as representative of the whole period which was characterized by large investments in canals and drains and the absence of any major construction works. Thus the apparent rise during this period in the share of wages and the drop in that of building materials and metals.

In period (iv), weights were based on the composition of investment in irrigation and drainage for 1959/60-1964/65. The major project carried out during this period, the first stage of the High Dam, accounted for £E. 102.8m., or 41% of total investment. According to the High Dam Authority, the share of

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32. The relative share of different components for the major works on the Nile were as follows:

Name of Work	Year of Construction	Cost, £E000	% to Total Cost	% share of Building Materials	Metals	Wages
i) Koshesha Escape	1890	62.6	1.4	58	23	19
ii) Aswan Barrage	1902	3,043.0	70.0	72	13	15
iii) Zifta Barrage	1902	305.0	7.0	11	68	21
iv) Esna Barrage	1906	945.0	21.6	71	7	22
Total		4,355.6	100.0			
Weighted Averages				67%	16%	17%

These percentages are based on the actual costs of the works as reported by Willcocks and Craig, op. cit., Vol.II, pp.630-675. Sharp fluctuations in these shares reflect the basic differences in the structure of the works studied.

33. Ministry of Finance, Final Accounts for the Year 1925-26, Cairo, 1927, pp.234-51.

wages in the total cost of the Dam amounted to 41.3%, that of building materials to 53.7% and metals to 5.0%. Investment in other works of irrigation (canals, drains and pumping stations), amounted to £E. 146.6m., or 59% of total investment, of which, according to an unpublished estimate by the Ministry of Planning, wages accounted for 72.6%. building materials 5.9% and metals 21.6%.[34] The over-all weights given to these three components are weighted averages of their share in total investment during the period 1959/60 - 1964/65. It is interesting to note that the high share of wages has been maintained and that of metals was more than doubled. The nature of the High Dam Structure (a rock-fill dam constructed of granite aggregate, sand and silt) required the employment of a massive army of labourers, and the techniques used in digging canals and drains remained highly labour intensive except in the reclamation areas. The rise in the share of metals, on the other hand, is most probably due to the construction of a number of pumping stations for the new covered drainage network.

It should, however, be emphasized at this point that this weighting system has its obvious limitations. Ideally, weights given to the three indices should have been assessed on the basis of the actual share in annual investment of wages, building materials and metals. But in the absence of

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34. Investment figures from Ministry of Planning, Follow-up Report of the 5-Year Plan, 1959/60-1964/65, Cairo, 1966. Detailed accounts of the High Dam from the Ministry of Information, The High Dam, 1960-1970, Cairo, 1971, pp.28-31. Data on the structure of investment in irrigation and drainage from the Ministry of Planning, Gross-Fixed Capital Formation by Type of Capital Goods, unpublished figures based on actual implementation of the 5-Year Plan.

such data, our estimates had to be based on such rough indicators as the 1912 Stock figures for period (i), and using one year's figures (1925) to estimate the weights over a period of 17 years (1913-1930). This implies the assumption that the structure of investment during each period was the same as that of the stock or during a benchmark year which, of course, might not be exactly true. In fact, it was not until the last period that such data became available as to allow a better assessment of the weights.

But these limitations are not likely to introduce serious biases. Slightly different weights would not change the resulting index very much as it is clearly dominated by the share of wages (60% - 70%) and the component indices move in more or less the same direction.

The third step in the computation of C.F. in irrigation and drainage is to measure the Capital Stock. I estimated that in 1912, the earliest year for which a comprehensive and reliable survey of irrigation works was available, F.C.S. in irrigation and drainage amounted to £E.30.3 million at current prices. This figure represents the total value of works of basin and perennial irrigation, surveyed by Willcocks and Craig in their classic on "Egyptian Irrigation", which amounted to £E.7,895,000 and £E.11,700,000 respectively, plus £E.10,695,000 to account for the cost of dams and barrages built on the Nile up to 1912[35].

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35. Works of irrigation and drainage existing in 1912 were as follows:

I. Works for basin irrigation: area cultivated fed. 1,286,635.

Nile Banks:	900km.	at £E.	400	= £E.	360,000
Basin Banks:	3000km.	" "	600	= "	1,800,000
Basin Canals:	4000km.	" "	600	= "	2,400,000
Basin drains:	250km.	" "	120	= "	30,000
Basin Escapes:	90km.	" "	2500	= "	225,000
Basin regulators:	900km.	" "	1000	= "	900,000
Basin syphons:	60km.	" "	3000	= "	180,000
Land:	40,000 acres	" "	50	=1 "	2,000,000
				Total	7,895,000

Source: W. Willcocks and Craig, op. cit., pp. 345-346.

Expressed in terms of 1960 prices, by using the same deflator as for the investment series, the stock of fixed capital in 1912 (at constant 1960 prices) amounted to £E.145.7m. Stock figures before (or after) this year were obtained by subtracting (or adding) annual investment figures to that stock (Table 2.1). Figures on C.F. and C.S. are regarded as net of depreciation. To start with, canals and drains are cleared every single year and restored to their initial dimensions. In view of this continuous maintenance, the age of canals becomes immaterial and since maintenance costs are not included in the present estimate, the need does not arise to account for depreciation. But dams and barrages pose more serious problems as they are supposed to depreciate in value and efficiency over time. However, these structures are continually maintained and in fact all the dams and barrages built on the Nile are still functioning until now with one exception; the Delta Barrage built in 1861 and replaced by Mohamed Ali Barrage in 1934-9 for which an allowance was made. In this case, I decided not to account for depreciation of other dams and barrages as they are kept almost intact through sizeable annual expenditure on maintenance which was not included in my estimate of C.F. The assumption is thus, in effect, that this expenditure maintains the economic life of the asset and thereby

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... II. Works of perennial irrigation: area cultivated fed. 4.1m:

Nile Banks:	1,440km.
Canals:	14,960km.
Drains and Escapes:	6,420km.
Regular and Escape Heads	2,370km.
Syphons and Aqueducts:	320km.

Willcocks and Craig reported "The original cost...of the canals at £E.6.6m., of the masonery works at £E.2.2m., of the Nile banks at £E.1.5m., and drains at £E.1.4m., we arrive at a total of £E.11.7m.
Source: Ibid., p.427.

III. Dams and Barrages

Name of Work	Year	cost £E. million
The Delta Barrage	1861	4,000
Aswan Barrage	1898-1902	3,043
Assiut Barrage	1902	0,870
Zifta Barrage	1901-1903	0,305
" " (Subsidiary Works)	1905-1907	0,302
Esna Barrage	1906-1908	0,945
Aswan Barrage (1st Heightening)	1912	1,500
Total value in	1912	10,695

Source: Ministry of Public Works, Annual Report, various issues.

Table 2-1

Capital Formation and Capital Stock in Irrigation and Drainage, 1882-1967

(£.E.m.)

Year	Investment at Current Prices (1)	Deflator 1960=100 (2)	C.F. at 1960 Constant Prices (3)	C.S. at 1960 Constant Prices (4)
1882	0.039	20.0	-	49.1
83	0.052	19.7	0.3	49.4
84	0.059	19.3	0.3	49.7
85	0.085	18.9	0.5	50.2
86	0.114	18.2	0.6	50.8
87	0.366	17.8	2.1	52.9
88	0.367	17.6	2.1	55.0
89	0.154	17.9	0.9	55.9
1890	0.424	18.4	2.3	58.2
91	0.321	18.1	1.8	60.0
92	0.114	17.5	0.7	60.7
93	0.036	16.9	0.2	60.9
94	0.030	16.6	0.2	61.1
95	0.007	16.4	0.0	61.1
96	0.003	16.5	0.0	61.1
97	0.250	16.6	1.5	62.6
98	0.355	17.5	2.0	64.6
99	0.400	18.1	2.2	66.8
1900	0.423	18.8	2.3	69.1
01	0.737	18.0	4.1	73.2
02	1.571	16.9	9.3	82.5
03	1.382	17.2	8.0	90.5
04	0.625	17.0	3.7	94.2
05	0.885	17.2	5.1	99.3
06	1.374	17.9	7.7	107.0
07	1.688	19.1	8.8	115.8
08	1.753	19.1	9.2	125.0
09	1.396	18.7	7.5	132.5
1910	1.155	19.1	6.1	138.6
11	0.702	19.3	3.6	142.2
12	0.718	20.8	3.5	145.7
13	0.722	22.7	3.2	148.9
14	0.681	22.6	3.0	151.9
15	0.297	28.1	1.1	153.0
16	0.321	34.3	0.9	153.9
17	0.471	41.7	1.1	155.0
18	0.520	47.6	1.1	156.1
19	0.462	57.5	0.8	156.9
1920	1.195	65.6	1.8	158.7
21	0.945	61.8	1.5	160.2
22	0.440	49.0	0.9	161.1
23	0.469	45.3	1.0	162.1
24	0.642	42.9	1.5	163.6
25	0.725	41.1	1.8	165.4
26	0.848	39.6	2.1	167.5
27	1.366	37.7	3.6	171.1
28	1.877	35.1	5.3	176.4
29	2.771	27.7	10.0	186.4
1930	3.091	26.1	11.8	198.2
31	3.301	24.2	13.6	211.8
32	4.000	22.2	18.0	229.8
33	3.159	20.7	15.3	245.1
34	2.809	16.9	17.6	262.7
35	3.206	17.7	18.1	280.8
36	3.171	19.5	16.3	297.1
37	3.571	21.8	16.4	313.5
38	3.572	22.1	16.2	329.7
39	3.633	21.8	16.7	346.4
1940	2.066	30.7	6.7	353.1
41	1.079	37.0	2.9	356.0
42	1.114	46.7	2.4	358.4
43	1.259	53.7	2.3	360.7
44	1.500	66.6	2.3	363.0
45	1.741	85.4	2.0	365.0
46	4.162	76.5	5.4	370.4
47	4.577	76.3	6.0	376.4
48	3.022	77.9	3.9	380.3
49	3.021	76.2	4.0	384.3
1950	3.181	75.7	4.2	388.5
51	3.348	93.9	3.6	192.1
52	5.074	95.8	5.3	397.4
53	6.800	85.5	8.0	405.4
54	9.300	80.9	11.5	416.9
55	9.300	77.7	12.0	428.9
56	9.800	95.8	10.2	439.1
57	7.500	98.6	7.6	446.7
58	7.200	99.2	7.3	454.0
59	9.700	99.4	9.8	463.8
1960	12.800	100.0	12.8	476.6
61	21.600	107.0	20.2	496.8
62	34.100	114.2	29.2	526.7
63	53.200	120.5	44.1	570.8
64	71.200	127.7	55.8	626.6
65	56.500	137.9	41.0	667.6
66	51.600	156.4	33.0	700.6
67	50.900	173.9	29.3	729.9

gives it an essentially permanent character. This treatment is obviously not entirely satisfactory and in fact may result in slightly overestimating the value of C.S. The view that the whole asset is everlasting takes no account of obsolescence, or of gradual deterioration to which irrigation works are subject even with continuous maintenance. Moreover, it is necessary to take account of the fact that these assets include quite short-lived items such as regulators, sluice engines and locks. However, the highly aggregated nature in which maintenance figures are reported, made it impossible to follow the normal procedure of capitalizing the value of maintenance cost that improves the asset or adds to its life and allowing for annual depreciation in the usual manner.

Finally, as a cross check on our results, a comparison is made between F.C.S. and other physical measures such as the length of canals and drains and the horsepower equivalent of irrigation and drainage machinery. Table 2.2 and Chart 2.1 show that the three aggregates, expressed in terms of indices, 1935-39 = 100, display similar trends for the period as a whole but with notable discrepancies in the rates of change especially before World War II.

Table 2-2

Comparison of C.S. in Irrigation and Drainage with Other Indicators, Indices, 1935-39 = 100

Years	Capital Stock £Em.	Index	Canals and Drains Length in Kilometres (thousands)	Index	Machinery Horse-power (thousands)	Index
	(1)		(2)		(3)	
1885-89	53.0	17	9.8	33	-	-
1890-94	60.2	19	12.0	41	-	-
1895-99	63.3	20	13.7	47	22.2 (3)	7
1900-04	81.9	26	16.3	56	-	-
1905-09	115.9	37	20.1	69	-	-
1910-14	145.5	46	27.1	92	62.4 (4)	21
1915-19	155.0	49	24.8	85	-	-
1920-24	161.1	51	24.8	85	-	-
1925-29	174.4	56	25.8	88	-	-
1930-34	229.5	73	27.2	93	361.4	120
1935-39	313.5	100	29.3	100	302.4	100
1940-44	358.2	114	32.6	111	336.6	111
1945-49	375.3	120	34.3	117	347.2	115
1950-54	400.0	128	35.2	120	392.4	130
1955-59	446.5	142	37.3	127	449.7 (5)	149
1960-64	539.5	172	38.8 (1)	132	460.3 (6)	152
1965-67	699.4	223	41.6 (2)	142	662.7	219

Notes:
(1) Average of 1960-62 only.
(2) Refers to 1967 only.
(3) Refers to 1899, the earliest year for which data could be traced.
(4) Refers to 1912 only.
(5) Average of 1960-61 only. No data available for 1962-64.
(6) Refers to 1965, the latest year for which data available.

Sources: Column (1); Table 2-1, above.
Column (2); 1884-1912: Egyptian Government, Statistical Returns, 1880-1904, Cairo 1906 and J. Barois, Les Irrigations en Egypte, Paris, 1911, pp.284-313.
1913-62: Annuaire Statistique, various issues.
1963-67: C.A.P.M.S., Bulletin of Irrigation and Water Resources, 1966/67, Ref. No. 02-421, Cairo 1968, pp.12 and 17.
Column (3); Before 1930: J.D. Atkinson, Handbook of Egyptian Irrigation, Ministry of Public Works, Cairo 1934, 1930-60: Annuaire Statistique, various issues, 1960-67: C.A.P.M.S. Mechanization of Agriculture in the U.A.R., Ref. No. 66154T, 1966, p.17.

CHART 2.1

COMPARISON OF CAPITAL STOCK IN IRRIGATION WITH OTHER INDICATORS.

INDEX

250
200
150
100
50

1885-89
1890-94
1895-99
1900-4
1905-9
1910-14
1915-19
1920-24
1925-29
1930-34
1935-39
1940-44
1945-49
1950-54
1955-59
1960-64
1965-67

CAPITAL STOCK.

MACHINERY IN HORSE-POWER.

LENGTH OF CANALS & DRAINS.

2.3 Capital Formation in Rural Dwellings and Farm Buildings

2.3.1 Problems of Definition

Rural residential buildings should not in principal be regarded as part of capital formation in agriculture but as investment in a totally different sector, residential dwellings. As Colin Clark argues, "The dwelling of the farm family or the farm workers and their families should not be counted as part of the capital requirements of agriculture -- on the good grounds that these people would require housing if they were not engaged in agriculture at all. Some farmers provide themselves with much more costly houses than others, the cost being largely a function of the income which they are receiving. But in no case should this cost be treated as part of the capital requirements of agriculture"[36]. In some forms of agriculture, however, people and livestock are housed in a single building. In this case, there is some justification for including in agricultural CF a part of investment in rural dwellings because these usually serve as farmers' work premises and thus play an important role in contributing directly to agricultural income[37]. To ignore this type of investment, especially in less developed countries where the majority of population live in rural areas, is to overlook an important component of CF by the peasants[38]. Non-residential farm buildings (such as warehouses, stores, stables and barns) should also be included in agricultural CF as they are directly connected with the production process[39].

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36. Colin Clark, Capital Requirements in Agriculture -- An International Comparison, Agricultural Economics Research Institute, Oxford, 1967, p.1.
37. Ibid., p.1.
38. This item of CF has been largely ignored in estimates for less developed countries on the grounds that it is not significant or difficult to find data on. See for example: Tara Shukla, Capital Formation in Indian Agriculture, Bombay, 1965.
39. U.N., Concepts and Definitions of Capital Formation, op. cit, p.18.

It is extremely difficult in practice, however, to distinguish that part of the dwelling that should be included in CF, and an essentially arbitrary decision has to be taken in view of the nature of the habitat and the way of life in the country studied. In the case of Egypt, I assumed that it would be reasonable to include in agricultural CF half the investment in rural dwellings plus all the investment in farm buildings. This assumption is based on the description of rural habitat in Egypt, which will be briefly outlined in the following section as it also provides a necessary background to the description of the methods followed in measuring CF in this item.

2.3.2. Description of Rural Habitat in Egypt.

In the context of the Egyptian village, one could speak of a "Typical House". B. Theodorovetch, a Yugoslav housing expert who made a study covering eight villages in the Delta, found out that "Most of the fellaheen's houses in the Nile Delta are the same with the exception of those of the 'Omdah' (mayor), the few rich farmers, and the scattered modern houses now being built at the outskirts of the villages. Therefore, we can consider this kind of fellaheen's houses as representative of the poor farmers houses in the Delta"[40].

This typical house is usually a one-storey rectangular building with the dimension 6-11 meters length, 5-10 width, and 3 height. It usually contains three rooms plus the cattle shed, (Zeribah), and the store. This division of the house corres-

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40. B. Theodorovetch, Problems of Housing in the Egyptian Countryside, U.N.E.S.C.O., Basic Education Centre, Sirs el-Layan, Egypt, 1955, p.5. This view was shared by Ayrout in his classic on the "Egyptian Peasant", where he stated that "The typical fellah house, representing 92% of the total, is made of earth. It is a dwelling with neither charm nor age, but still one more sign of the persistent uniformity of the Egyptian peasantry", H.H. Ayrout, The Egyptian Peasant, Boston, 1968, p.115.

ponds with the functions the fellah requires from his lodging. "Usually, the house contains three compartments, the lodging, the shed, and the store. The first is the home of the peasant, the second is for the labour animals, and the third is used to preserve the crops. Divided in this way, this "triangular" house indicates the double status of the peasant; that of a small cultivator and that of a very small éleveur at the same time"[41]. This indicates that the function of the house is not only residential, but it provides productive services to agriculture and therefore should be accounted for as capital formation. This is particularly important in view of the fact that "The shed, or Zeribah, is sometimes the principal, and most spacious part of the house, and it is usual that you meet the buffalo or the camel before being introduced to the landlord"[42].

Almost all the houses are built from mud bricks usually called tub akhdar, or green-bricks[43]. These are made out of a mixture of the Nile mud and straw. The fellah does not make them, he has to hire a specialized mason to do the job. It was estimated that to lay 1000 bricks needs three men working for 12 hours[44]. These bricks make the walls. No cement is used. Mud is used in brick-laying. The walls form a quadruple more or less regular. In the angles and in the middle there are logs of wood to support the ceiling. The ceiling is made

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41. J. Lozach and G. Hug, L'Habitat Rural En Egypte, Cairo, 1930, p. 119.
42. Ibid., p.32.
43. In their questionnaire, Lozach and Hug found decisive support for this fact. "The red-brick house is a rare exception to which the interviewers attracted our attention by saying that there is only one red-brick house in each village and we found that this house was usually the Omda's", Ibid., pp.88-9.
44. Ibid., p.88.

of palm branches covered with earth. The plaster used is made of mud and straw mixture. Usually, there is one opening for the door and another three for the windows[45].

The above description of the house of the fellah has hardly changed over time. "Dans ce village dont l'aspects n'a pas été profondément modifié depuis des millénaires, la maison n'a guère changé non plus; elle as restée ce qu'elle était lors de l'expédition d'Egypte, ce qu'elle était sans doute a l'époque pharaonique... La maison est un fait géographique au premier chef"[46].

2.3.3 Estimate of Capital Formation and Capital Stock in Rural Dwellings and Farm Buildings.

A. Gross Fixed Capital Stock: Estimates of GFCS in rural dwellings and farm buildings at 1960 prices were obtained by adding half the value of GFCS in residential buildings (obtained by multiplying the number of dwellings at the end of each year by the 1960 average market price of the "typical house"), to an estimate of GFCS in farm buildings (one third of GFCS in dwellings).

The starting point in estimating GFCS in residential buildings, was to enumerate the number of dwellings in the 4000 villages and 1400 Izbas, or farm-estates, that make up rural Egypt. Fortunately, the Population Census, carried out every decade since 1882, provides such an enumeration[47]. In

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45. Ayrout, op. cit., pp.115-117.

46. Lozach and Hug, op. cit., p.23.

47. Department of Statistics and Census, Population Census of Egypt, 1882, 1897, 1907, 1917, 1927, 1937, 1947, 1960 and C.A.P.M.S., Final Result of the Population Census by Sample, 1966, Vol.II, Cairo, July 1967. 1967 figures are based on the number of houses built during that year. See C.A.P.M.S., Statistical Year-Book of U.A.R., 1952-1968, June, 1969, p.168.

view of the lack of any better alternative, we accepted the Census division between "rural" and "urban" areas which is based on administrative rather than economic criteria[48]. Decennial figures on the number of houses reported by the Census were smoothly interpolated to cover inter-censal years. The second step was to estimate the 1960 value of the "typical house" of the fellah described above. As the market for those houses is very limited and, therefore, a market price is extremely difficult to find, I followed the physical approach according to which the value of the house in a given year was assumed to be equal to the cost of different inputs used in its construction at that year's prices.

The typical house contains three rooms and the Zeribah, cattle shed, with the dimensions of 10 x 8 x 3 meters on average. Therefore the length of walls is 55 meters, the thickness is 0.40 meters (the wall is 1.5 bricks in thickness, a brick is 25 x 10 x 5 = 37 centimetres + 3 for plaster = 0.40 meters), and the height is 3 meters. This makes the volume of masonry 55 x 0.40 x 3 = 66 cubic meters. If we know that the volume of a single brick is 25 x 10 x 5 = 0.00125 cubic meters, a cubic meter of walls would require 800 bricks and a house would require 800 x 66 = 52,800 bricks. To estimate the value of masonry work at 1960 prices we multiply the number of bricks by the price of 1000 bricks in 1960. There-

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48. The census follows the Police divisions between urban and rural areas where the former includes Cairo, Alexandria and the capital cities of Governorates and Districts as well as other towns, while the latter includes villages and their sattelites. According to this definition, many towns whose agriculture is an important occupation, will be classified as urban and not rural.

fore, the value of masonry would be 52.8 x £E.0.40 = £E.21.120[49]. To this we add £E.10 for brick-layers (a mason helped by a boy make, say $3m^3$ a day, the $66m^3$ represent 20 work days, a man's wage between £E.0.300-0.400, and a boy's wage is £E.0.100 a day, i.e. £E.0.50 wages a day x 20 days = £E.10.00). If we estimate the value of the door and windows at £E.4 and the roof at £E.10, the total value of the fellah's house would amount to £E.45.120, say £E.50 to allow for luxury houses[50]. This seems to be a reasonable value supported both by personal knowledge of the Egyptian village, and by H. Ayrout who in 1938 estimated that "the house and site together will not amount to much more than fifty pounds"[51]. Assuming that the gain in the value of real estate due to price increases between 1938 and 1960 was roughly equal to the value of the building site (which is excluded from my estimate), the imputed value of the fellah's house, £E.50 at 1960 prices, appears plausible.

The number of dwellings for each year was multiplied by the value of the "typical house" to obtain the value of C.S. in rural dwellings. As explained earlier, only 50% of this value was included in my estimate of C.S. in agriculture.

Finally, non-residential buildings (such as warehouses, stores, stables and barns, agricultural office buildings) were

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49. An interesting cross-check on our calculation is possible by comparing the change in the value of bricks and agricultural wage rate at two different points of time. In the 1920's, 1000 mud-bricks used to cost P.T.8-12 and red-bricks P.T.90-120, while wage rate was P.T.3 per day. In 1960 the price of red-bricks was P.T.400 and mud-bricks P.T.40 (= 1/10th of red-bricks) while wage rate was P.T.12 per day. This means that both prices and wages increased by the same rate and, therefore, the value we gave to masonry work seems reasonable.

50. Luxury houses here mean those with a larger number of rooms or rather expensive doors and windows.

51. Ayrout, op. cit., p.117.

added to GFCS in dwellings. The significance of investment in these assets is a function of farm size; being unimportant on small farms (usually family farms) and increasing in importance on the large farms (usually commercially-run farms). Unfortunately, neither the Population Census nor the Agricultural Census cover this important item. To account for it I depended on an informed guess. This guess is based on the accounts of big firms owning large estates in Egypt from the beginning of private land ownership in the second half of the 19th Century to the Agrarian Reform Law in 1952. According to my estimate these farm buildings would roughly account for about one third of the value of C.S. in dwellings[52]. Estimates of GFCS in dwellings were, therefore, raised by one third to obtain total GFCS in dwellings and farm buildings.

It is important to emphasize here that the Capital Stock figures obtained by valuing inventories at 1960 market prices approximate to gross capital stock estimates. This is because the underlying inventories are net of retirements in the sense that they do not include items which have disappeared since the previous inventory was taken; and this is in principle what is required for the gross stock.

B. Gross Fixed Capital Formation and Scrapping: The change in any year in the gross capital stock is equal to the difference between gross fixed capital formation and scrapping. Algebraically, this is given by:

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52. A better alternative would have been to relate the value of farm buildings to the size of farm, but in the absence of data on the distribution of land by size, we had to resort to the accounts of land companies. For an excellent account of these companies and their activities (1856-1934), see A.E. Crouchley, The Investment of Foreign Capital in Egyptian Companies and Public Debt, Ministry of Finance Technical Paper No.12, Cairo, 1936, and M.M. Hamdi, A Statistical Survey of the Development of Capital Investment in Egypt Since 1880, unpublished Ph.D. Thesis, London, 1943.

$$G_t - G_{t-1} = I_t - S_t$$

where; G_t is the stock at the end of the year t, G_{t-1} is the stock at the end of the previous year, and I and S are GFCF and scrapping during t. Since we know the change each year in the gross capital stock, it is possible to derive either the gross capital formation or the scrapping series if the other one is known. In practice we know neither. For the purpose of this study, I have made very rough estimates of scrapping and hence derived a series of GFCF[53].

Scrapping was estimated by assuming a constant length of life for each asset from which it follows that all the GFCS at the end of any given year must be scrapped by the end of the Lth succeeding year; L being the assumed length of life of the asset. By choosing an arbitrary set of years L years apart, estimates of total scrapping in each L-year period were made. These totals were then spread over the L years in the period in such a way as to produce a smooth series. Accordingly, in the case of Dwellings and Farm Buildings, the period 1882-1967 was divided into three periods of 30 years, which is equal to the length of life assumed for these assets in the measurement of depreciation, namely; 1883-1912, 1913-1942 and 1943-1972[54]. Total scrapping, equal to the gross stock in the first year of each interval, was then spread over the succeeding thirty years in a fairly smooth way.

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53. This method will also be applied in the case of "Livestock" and "Traditional Agricultural Machinery".
54. See Section C, below.

The basic disadvantage of this method is the arbitrary choice of the set of years for which totals of scrapping were estimated; 1882, 1912 and 1942 in this case. Different years may have given different figures. Discrepancies can be particularly serious in cases of rapid change or pronounced fluctuations in the GFCS series. But this does not really matter in the case of Rural Dwellings and Farm Buildings where the movement of the GFCS was notably smooth over the whole period (Table 2-3).

Figures on annual scrapping, thus obtained, were then used to derive the gross capital formation estimates. GFCF in a given year was the sum of the change in GFCS and scrapping during that year. Using the same notation as before, this was given by:

$$I_t = G_t - G_{t-1} + S_t$$

where I_t = GFCF, all variables at 1960 prices.

C. Depreciation, Net Fixed Capital Formation and Net Fixed Capital Stock:

Estimates of NFCF were obtained, in the usual way (Chapter I, Section 1.3), by deducting from GFCF for each year, estimates of depreciation during that year. Depreciation was accounted for by using the straight-line method, and assuming an annual rate of depreciation of 3.3%. This rate and the assumed length of life (30 years) are those estimated for rural residential dwellings and farm buildings by the Housing and Construction Unit of the National Planning Committee for the housing plan during the years 1960-64[55].

55. National Planning Committee, A Summary of Housing Plan for the Years 1960-64, Memo. No.376, Cairo, 1959, p.4.

Finally, NFCS at the end of each year was calculated according to the perpetual inventory method (Chapter I, Section 4.1). To start off the series, NFCS in the initial year, 1882, was found by deducting from GFCS in that year (i.e. from the sum of GFCF over the 30 years before 1882) an estimate of cumulated depreciation over the 30 years before 1882. Depreciation in each of the thirty years was estimated as 3.3% of total GFCF that had taken place since 1852, cumulated GFCF series being estimated by extrapolating backwards the 1882 GFCF estimate, on the basis of the scrapping estimates for 1883-1912.

Table 2-3 shows the estimates of capital formation and capital stock in Rural Dwellings and Farm Buildings.

Table 2-3

Capital Formation and Capital Stock in Rural Dwellings and Farm Buildings, 1882-1967

Year	No. of Rural Dwellings (1)	Value of (1) at 1960 Prices (2)	GFCS in Rural Dwellings and Farm Buildings (3)	Scrapping (4)	GFCF (5)	Depreciation (3.3) (6)	NFCF (7)	NFCS (8)
1882	802,592	40.0	26.7					16.10
83	832,491	41.6	27.7	0.41	1.41	0.91	0.50	16.60
84	862,385	43.0	28.7	0.44	1.44	0.95	0.49	17.09
85	892,279	44.6	29.7	0.47	1.47	0.98	0.49	17.58
86	922,173	46.0	30.7	0.51	1.51	1.01	0.50	18.08
87	952,067	47.6	31.7	0.54	1.54	1.05	0.49	18.57
88	981,961	49.0	32.7	0.57	1.57	1.08	0.49	19.06
89	1,011,855	40.6	33.7	0.61	1.61	1.11	0.50	19.56
1890	1,041,749	52.0	34.7	0.64	1.64	1.15	0.49	20.05
91	1,071,643	53.6	35.7	0.67	1.67	1.18	0.49	20.54
92	1,101,537	55.0	36.7	0.71	1.71	1.21	0.50	21.04
93	1,131,431	56.6	37.7	0.74	1.74	1.24	0.50	21.54
94	1,161,325	58.0	38.7	0.77	1.77	1.28	0.49	22.03
95	1,191,219	59.6	39.7	0.81	1.81	1.31	0.50	22.53
96	1,221,113	61.0	40.7	0.84	1.84	1.34	0.50	23.03
97	1.251,012	63.0	42.0	0.87	3.57	1.39	2.18	25.21
98	1,283,872	64.2	42.8	0.91	1.71	1.41	0.30	25.51
99	1,316,732	65,8	43.9	0.94	2.04	1.45	0.59	26.10
1900	1,349,592	67.5	44.9	0.97	1.97	1.48	0.49	26.59
01	1,382,452	69.1	46.0	1.01	2.11	1.52	0.59	27.18
02	1,415,312	70.8	47.2	1.04	2.24	1.56	0.68	27.86
03	1,448,172	72.4	48.2	1.07	2.07	1.59	0.48	28.34
04	1,481,032	74.1	49.3	1.11	2.21	1.63	0.58	28.92
05	1,513,892	75.7	50.4	1.14	2.24	1.66	0.58	29.50
06	1,546,752	77.3	51.5	1.17	2.27	1.70	0.57	30.07
07	1,579,598	80.0	53.3	1.21	3.01	1.76	1.25	31.32
08	1,599,787	81.0	54.0	1.24	1.94	1.78	0.16	31.48
09	1,619,976	82.0	54.7	1.27	1.97	1.81	0.16	31.64
1910	1,640,165	83.0	55.3	1.31	1.91	1.82	0.09	31.73
11	1,660,354	84.0	56.0	1.34	2.04	1.85	0.19	31.92
12	1,680,543	85.0	56.7	1.37	2.07	1.87	0.20	32.12
13	1,700,732	86.0	57.3	1.40	2.00	1.89	0.11	32.23
14	1,720,921	87.0	58.0	1.43	2.13	1.91	0.22	32.45
15	1,741,110	88.0	58.7	1.47	2.17	1.94	0.23	32.68
16	1,761,299	89.0	59.3	1.50	2.10	1.96	0.14	32.82
17	1,781,489	90.0	60.0	1.53	2.23	1.98	0.25	33.07
18	1,814,124	91.0	60.7	1.57	2.27	2.00	0.27	33.34
19	1,846,759	92.3	61.5	1.60	2.40	2.03	0.37	33.71
1920	1,879,394	94.0	62.7	1.63	2.83	2.07	0.76	34.47
21	1,912,029	95,6	63.7	1.67	2.67	2.10	0.57	35.04
22	1,944,664	97.2	64.8	1.70	2.80	2.14	0.66	35.70
23	1,977,299	98.9	65.9	1.73	2.83	2.17	0.66	36.36
24	2,009,034	100.5	66.9	1.77	2.77	2.21	0.56	36.92
25	2,042,569	102.0	68.0	1.80	2.90	2.24	0.66	37.58
26	2,075,204	103.8	69.2	1.83	3.03	2.28	0.75	38.33
27	2,107,842	105.0	70.0	1.87	2.67	2.31	0.36	38.69
28	2,142,682	107.0	71.3	1.90	3.20	2.35	0.85	39.54
29	2,177,522	108.9	72.6	1.93	3.23	2.40	0.83	40.37
1930	2,212,362	110.6	73.7	1.97	3.07	2.43	0.64	41.01
31	2,247,202	112.4	74.9	2.00	3.20	2.47	0.73	41.74
32	2,282,042	114.0	76.0	2.03	3.13	2.51	0.62	42.36
33	2,316,882	115.8	77.2	2.07	3.27	2.55	0.72	43.08
34	2,351,722	117.6	78.5	2.11	3.41	2.59	0.82	43.90
35	2,386,562	119.3	79.4	2.15	3.05	2.62	0.43	44.33
36	2,421,402	121.0	80.5	2.19	3.29	2.66	0.63	44.96
37	2,456,229	123.0	82.0	2.23	3.73	2.71	1.02	45.98
38	2,466,828	123.5	82.2	2.27	2.47	2.71	-0.24	45.74
39	2,477,427	124.0	82.6	2.30	2.70	2.73	-0.03	45.71
1940	2,488,026	124.6	83.0	2.33	2.73	2.74	-0.01	45.70
41	2,498,625	125.0	83.3	2.35	2.65	2.75	-0.10	45.60
42	2,509,224	125.6	83.7	2.37	2.77	2.76	0.01	45.61
43	2,519,823	126.0	84.0	2.40	2.70	2.77	-0.07	45.54
44	2,530,422	126.7	84.5	2.43	2.93	2.79	0.14	45.68
45	2,541,021	127.0	84.6	2.45	2.55	2.79	-0.24	45.44
46	2,551,620	127.8	85.2	2.48	3.08	2.81	0.27	45.71
47	2,562,219	128.0	85.3	2.50	2.60	2.81	-0.21	45.50
48	2,572,818	128.6	85.7	2.53	2.93	2.83	0.10	45.60
49	2,583,417	129.0	86.0	2.56	2.86	2.84	0.02	45.62
1950	2,594,016	129.7	86.6	2.58	3.18	2.86	0.32	45.94
51	2,604,615	130.0	86.6	2.61	2.61	2.86	-0.25	45.69
52	2,615,214	130.8	87.2	2.64	3.24	2.88	0.36	46.05
53	2,625,813	131.0	87.3	2.66	2.76	2.88	-0.12	45.93
54	2,636,412	131.8	88.0	2.69	3.39	2.90	0.49	46.42
55	2,647,011	132.0	88.0	2.72	2.72	2.90	-0.18	46.24
56	2,657,610	132.8	88.5	2.74	3.34	2.92	0.42	46.66
57	2,668,209	133.4	88.9	2.77	3.17	2.93	0.24	46.90
58	2,678,808	133.9	89.3	2.80	3.20	2.95	0.25	47.15
59	2,689,307	134.5	89.7	2.83	3.23	2.96	0.27	47.42
1960	2,700,000	135.0	90.0	2.86	3.16	2.97	0.19	47.61
61	2,834,000	141.7	94.4	2.89	7.29	3.12	4.17	51.78
62	2,968,000	148.4	98.9	2.92	7.42	3.26	4.16	55.94
63	3,102,000	155.1	103.3	2.94	7.34	3.41	3.93	59.87
64	3,236,000	161.8	107.8	2.97	7.47	3.56	3.91	63.78
65	3,370,000	168.5	112.2	3.00	7.40	3.70	3.70	67.48
66	3,500,000	175.0	116.5	3.02	7.32	3.84	3.48	70.96
67	3,530,400	176.5	117.6	3.05	4.15	3.88	0.27	71.23

2.4 Capital Formation in Livestock

In the context of Egyptian agriculture, as in many underdeveloped countries, livestock assumes great importance as a component of capital. In those circumstances livestock are more than a factor of production. Where machinery is scarcely used, draught animals provide the peasant with an indispensable source of power and means of transport, while cattle and sheep produce milk and meat[56]. In Egypt, the buffalo and the donkey have been the fellah's faithful auxiliaries, well adapted to his needs and to Egyptian conditions. The camel is used for carrying fodder and fuel and for harvest work, but camels and mules, being less adaptable are relatively little used by the agriculturalist. Goats and sheep are basic meat animals[57].

Methods used to estimate CF and CS in livestock are essentially those followed in the case of dwellings and farm buildings. In the absence of any expenditure data, we had to follow the physical approach. GFCS in livestock at 1960 prices was estimated by multiplying the number of animals by their 1960 market price. The first step in estimating the gross stock was to take a decision regarding what and what was not to be included in this estimate. According to the UN System of National Accounts, GFCF in agriculture should include the "value of additions to, less disposals of, breeding stock, draught animals, dairy cattle, and sheep, llamas, etc.

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56. For an interesting comparison with South-East Asia, see, G. Myrdal, Asian Drama, New York, 1968, Vol.II, pp.1272-8.

57. H.H. Ayrout, The Egyptian Peasant, op. cit., p.38.

raised for wool clipping; and transfer costs in respect of the purchase of these animals for these purposes"[58]. This definition is all-inclusive and does not distinguish between items of livestock that could be considered as capital investment and others that may be more appropriately treated as products for consumption such as young animals which are slaughtered before they reproduce themselves. In practice, such distinction is difficult to make, and a more or less arbitrary decision has to be taken. I decided to include in the gross stock all animals of burden (camels, donkeys, horses and mules), all big (above 3 years of age) and half the medium (1-3 years) number of cattle, all pigs, and big sheep and goats. Half the medium and all small (less than one year) cattle, and all medium and small sheep were excluded from F.C.S. on the grounds that they are used for consumption purposes and do not represent an addition to the productive capacity in agriculture. My decision was based on the same criterion advanced by agronomists and adopted by the National Planning Committee in estimating agricultural CS for the year 1955[59].

The second step in estimating GFCS in livestock was to obtain annual data on the number and age structure of the different categories of animals to be included in this stock. There was no problem in obtaining such data for the period 1919-1967, where they were provided in great detail by the returns of the "Census of Livestock" undertaken every two

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58. U.N., A System of National Accounts, Studies in Methods, Series F, No.2, Rev.3, New York 1968, pp.114-5.

59. N.P.C. Estimates of Output and Investment in the Agricultural Sector, 1953-1957, Cairo, 1959, pp.1-4.

years since 1919[60]. Figures for the intervening year between each two successive censuses were obtained by simple interpolation (Appendix Table A-7). The value of GFCS for each year during that period was found by multiplying the number of animals we decided to include in the stock by their 1960 market price reported by the Ministry of Agriculture[61]. For years earlier than 1919, however, such comprehensive inventories of livestock as those provided by the "Census of Livestock" were not available. For the period 1904-1918, the Annuaire Statistique provides annual enumerations of some of the important categories of livestock[62]. Since these categories account for not less than 70% of the total value of the gross stock in the decade 1919-1929, I found it reasonable to impute the value of the categories not covered by the "Annuaire" assuming that their ratio to the total capital stock during the period 1904-18 was the same as that of the following decade. It was even more difficult to estimate GFCS for the period prior to 1904, where data on livestock were rare and extremely fragmented. An ideal solution would have been to attempt a backward extrapolation of the gross stock series using a model which relates investment in livestock to its main determinants; peasants' incomes, relative prices of animals and animal products, etc. But in the absence of such a model, I based my projections for the period 1897-1903 on the index of area allocated for clover, the main fodder for

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60. Department of Statistics and Census, Annuaire Statistique, various issues; Ministry of Agriculture, Agricultural Economy, Cairo, 1966, 1968; and C.A.P.M.S. Statistics of Animal Wealth, Cairo, September 1967.

61. Department of Statistics and Census, National Income from Agriculture, 1958-1960, Cairo, 1962. For a list of prices see Appendix Table A-4 below.

62. Annuaire Statistique, 1914 and subsequent issues, reproduced in Appendix Table A-6.

farm animals in Egypt, and for the period 1882-1897, where no data on clover was available, on the index of rural population[63]. Great care should be taken, therefore, in interpreting the GFCS figures before 1897 as they were based on a very rough indicator. The purpose of projecting the estimates backward for these few years was mainly to avoid a discontinuity of the aggregate estimates for total agriculture.

Finally, estimates of GFCF and scrapping, NFCF and depreciation, and NFCS were derived following exactly the same method as in the case of "Rural Dwellings and Farm Buildings", but with a different length of life. That is, a series for scrapping was estimated and from this and the GFCS series, GFCF was found from the relationship:

$$I_t = G_t - G_{t-1} + S_t$$

Depreciation was estimated as a constant proportion of the gross stock, and hence NFCF was found as the difference between GFCF and depreciation. The initial NFCS in 1882 was calculated by deducting cumulated depreciation from the initial GFCS[64].

The average length of life for livestock assumed in this study is seven years. This estimate represents a weighted average of the life spans of the various kinds of farm animals implied by the depreciation rates recommended by the Standardized Accounting System for application in Land Reform and newly reclaimed areas[65]. Weights were calculated for the different

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63. Data on the clover area from Appendix Table A-5 and on rural population Table A-3.

64. For details of these methods see Section 2.3.3 above.

65. Central Auditing Organization, The Standardized Accounting System of the UAR, Depreciation-Rates Tables, Cairo, 1967, p.24. These rates are as follows: cows and buffalos 15%, donkeys and mules 12.5%, horses and camels 10%, sheep 20%, goats and pigs 25%.

categories of animals in the gross stock in the years 1919 (the first comprehensive livestock census), 1939, 1950 and 1961 (the three Agricultural Census years). Differences in the weighted averages for these years were found to be negligible. As they all came to approximately 14.3%, an average length of life of 7 years was employed throughout[66].

The resulting estimates of capital stock and capital formation in livestock for the period 1882-1967 are presented in Table 2-4.

66. The exact rate of depreciation implied by 7 years and which was employed in our estimate is 14.286%.

Table 2-4

Capital Formation and Capital Stock in Livestock, 1882 - 1967

£E. million

Year	GFCS at end of year	Scrapping	GFCF	Depreciation (14.286%)	NFCF	NFCS
	(1)	(2)	(3)	(4)	(5)	(6)
1882	53.5					31.217
83	54.9	7.118	8.518	7.843	0.675	31.892
84	56.3	7.293	8.693	8.043	0.650	32.542
85	57.7	7.468	8.868	8.243	0.625	33.167
86	59.2	7.643	9.143	8.457	0.686	33.853
87	60.6	7.818	9.218	8.657	0.561	34.414
88	62.0	7.992	9.392	8.857	0.535	34.949
89	63.4	8.168	9.568	9.057	0.511	35.460
1890	64.8	8.343	9.743	9.257	0.486	35.946
91	66.3	8.581	10,081	9.472	0.609	36.555
92	67.7	8.819	10.219	9.672	0.547	37.102
93	69.1	9.057	10.457	9.872	0.585	37.687
94	70.5	9.295	10.695	10.072	0.623	38.310
95	71.9	9.533	10.933	10.272	0.661	38.971
96	73.4	9.772	11.272	10.486	0.786	39.757
97	74.7	10.122	11.422	10.672	0.750	40.507
98	74.9	10.244	10.444	10.700	-0,256	40.251
99	75.7	10.365	11.165	10.815	0.350	40.601
1900	74.7	10.486	9.486	10.672	-1.186	39.415
01	77.3	10.606	13.206	11.043	2.163	41.578
02	75.0	10.727	8.427	10.715	2.288	43.866
03	78.5	10.850	14.350	11.215	3.135	47.001
04	79.5	11.007	12.007	11.357	0.650	47.651
05	83.3	11.076	14.876	11.900	2.976	50.627
06	92.0	11.145	19.845	13.143	6.702	57.329
07	92.9	11.214	12.114	13.272	-1.158	56.171
08	90.1	11.284	9.484	12.872	-3.388	52.783
09	87.9	11.352	9.152	12.557	-3.405	49.378
1910	81.4	11.422	4.922	11.629	-6.707	42.671
11	79.8	11.460	9.860	11.400	-1.540	41.131
12	77.5	11.517	9.217	11.072	-1.855	39.276
13	76.9	11.573	10.973	10.986	-0.013	39.263
14	70.6	11.629	5.329	10.086	-4.757	34.506
15	65.4	11.685	6.485	9.343	-2.858	31.648
16	60.6	11.741	8.941	8.657	-1.716	29.932
17	65.8	11.795	16.995	9.400	7.595	37.527
18	65.6	9.400	9.200	9.372	-0.172	37.355
19	65.5	9.400	9.300	9.357	-0.057	37.298
1920	69.0	9.400	12.900	9.857	3.043	40.341
21	77.0	9.400	17.400	11.000	6.400	46.741
22	73.9	9.400	6.300	10.557	-4.257	42.484
23	78.5	9.400	14.000	11.215	2.785	45.269
24	87.7	9.400	18.600	12.529	7.071	52.340
25	86.1	12.031	10.431	12.300	-1.869	50.471
26	91.5	12.197	17.597	13.072	4.525	54.996
27	93.3	12.363	14.163	13.329	0.834	55.830
28	95.8	12.529	15.029	13.686	1.343	57.173
29	97.6	12.695	14.895	13.957	0.937	58.110
1930	94.9	12.860	10.160	13.557	-3.397	61.121
31	97.0	13.026	15.126	13.857	1.269	62.390
32	101.6	13.194	17.794	14.515	3.279	65.669
33	102.9	13.415	14.715	14.700	0.015	65.684
34	109.4	13.636	20.436	15.629	4.807	70.491
35	110.8	13.857	15.257	15.829	-0.572	69.919
36	115.5	14.078	16.778	16.215	0.563	70.482
37	129.3	14.229	30.099	18.472	11.627	81.809
38	128.3	14.521	13.321	18.329	-4.808	77.001
39	128.0	17.965	17.665	18.286	-0.621	76.380
1940	121.2	18.087	11.287	17.315	-6.028	70.352
41	115.5	18.208	12.508	16.500	-3.992	66.360
42	120.4	18.329	23.229	17.200	6.359	72.719
43	125.1	18.450	23.150	17.872	5.278	77.997
44	128.8	18.570	22.270	18.400	3.870	81.867
45	132.6	18.691	22.491	18.943	3.548	85.415
46	148.6	18.755	34.755	21.229	13.526	98.941
47	164.4	18.818	34.618	23.486	11.132	110.073
48	158.5	18.880	12.980	22.643	-9.663	100.410
49	152.7	18.943	13.143	21.815	-8.672	91.738
1950	150.1	19.006	16.406	21.443	-5.037	86.701
51	142.2	19.068	11.168	20.315	-9.147	77.554
52	136.1	19.130	13.030	19.443	-6.413	71.141
53	136.7	19.193	19.793	19.529	0.264	71.405
54	136.7	19.277	19.277	19.529	-0.252	71.153
55	142.4	19.360	25.060	20.343	4.717	75.870
56	143.7	19.443	20.743	20.529	0.214	76.084
57	145.3	19.526	21.126	20.758	0.368	76.452
58	146.9	19.609	21.209	20.986	0.223	76.675
59	153.6	19.692	26.392	21.943	4.449	81.124
1960	160.3	20.255	26.955	22.900	4.055	85.179
61	158.4	20.818	18.918	22.629	-3.711	81.468
62	172.6	21.380	35.580	24.658	10.922	92.390
63	175.3	21.943	24.643	25.043	-0.400	91.990
64	178.4	22.506	25.606	25.486	0.120	92.110
65	181.7	23.068	26.368	25.958	-0.410	91.700
66	184.7	23.630	26.630	26.386	0.244	91.944
67	192.2	24.193	31.693	27.458	4.235	96.179

2.5 Capital Formation in Agricultural Machinery

2.5.1 Introduction:

"Methods of production in Egyptian agriculture are on the whole, apart from the highly developed irrigation system and certain recently reclaimed areas, such as the Tahrir province, crude and simple, and on the small holdings the implements seem to a large extent to be the same as in ancient times"[67].

The Egyptian fellah has been using, besides his hands, a few primitive tools and, as Ayrout observed, "We see the same agricultural implements -- plough, water-wheel, winnowing fork, sickle, and straw basket... Following the pages of Herodotus, Diodorus Siculus, Strabo, Maqrizi, Vanskh, Pere Sicard and Volney, we find still the same fellah, no revolution, no evolution"[68].

Though evidence suggests that modern machinery, mainly pumps and tractors, were imported and used even before the First World War on a very limited scale on big farms and government domains, it was not until World War II that the trend towards mechanization has been more rapid[69]. This was due to the fact that the newly reclaimed desert-land required for its preparation highly capital-intensive methods. Imported machinery, especially tractors, are to be seen on big estates, cooperatives, and Tahrir province. However, agriculture in general, the great majority of small holdings outside the land-reform areas, is still unaffected by the increased use of machinery for field operations.

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67. Hansen and Marzouk, Development and Economic Policy in the U.A.R., op. cit., p.64.
68. H.H. Ayrout, op. cit., p.2.
69. Hansen and Marzouk, op. cit., p.65, and E.R.J. Owen, Cotton and the Egyptian Economy, 1820-1914, Oxford, 1969, p.258.

Reasons given to explain this lack of mechanization in Egyptian agriculture range from the psychological-sociological factors affecting the behaviour of the fellah[70], to real economic factors determining the process of substitution between abundant labour and scarce capital, and therefore, determining the choice of production technique[71]. Though this subject falls beyond the scope of the present study, the fact still remains that the use of backward techniques of production in Egypt has been contributing, among other factors, to a considerable loss in agricultural output. It was estimated that "about 10% of the crop is lost through hand and animal harvesting and threshing"[72].

2.5.2 Estimate of CF and CS in Agricultural Machinery

It is clear from the previous section that two distinct types of equipment are used on Egyptian farms; modern machinery almost entirely imported from abroad, and the traditional machines and implements made by local craftsmen in the village or nearby towns. Data on these equipments are scarce and whatever are available suffer from serious limitations. Stock figures of the number of machines, tools and implements

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70. See for example Ayrout, where he argues that "on the whole the fellahin ignore the machinery. This may be due to habit or ignorance; but the explanation may lie also in the instinct of self-preservation... To mechanize agriculture will destroy the organic relation which has grown up between the people and the land, and overthrown a way of life which has grown up as the only one suitable for an abundant population on a limited soil", Ayrout, op. cit., p.53.

71. For a discussion of the costs of mechanization vis-à-vis the present technique of production see Galal Amin, Food Supply and Economic Development with Sepcial Reference to Egypt, London, 1966, pp.73-77.

72. C.A.P.M.S., Mechanization of Agriculture in the U.A.R., Cairo, 1966, p.135.

are provided by the "Agricultural Census" for the years 1929, 1939, 1950 and 1961. To start with, the 1929 Census should be entirely discarded as it was very poor in coverage and had extremely limited response from farmers who firmly believed that its results were to be used for tax purposes. Moreover, while data on traditional machinery reported by later Agricultural Censuses (incidentally the only source of such data) seem to be satisfactory, those on modern machinery appear to be highly suspect because they imply a notably erratic rate of growth. This is difficult to reconcile with known facts on Egyptian agriculture, and most likely to be the result of statistical errors and inconsistencies.

In view of these limitations of available data, I decided to use the Census figures only for traditional machinery. As for modern machinery, I assumed they were entirely imported and therefore that import statistics could be used to estimate CF following the commodity-flow approach.

A. Modern Machinery: According to this method, GFCF in modern machinery was estimated by adding a 20% mark-up (trade margin and transportation cost[73]) to the c.i.f. value of Egypt's imports of various kinds of agricultural machinery, as reported by the "Annual Statement of Foreign Trade" between

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73. We applied the same trade and transportation markup (20%) to undustrial and agricultural machinery. For details see Chapter 3, Section 3.3.1 below.

1906 (the earliest year for which imports of agricultural machinery figured in foreign trade statistics) and 1967 (Appendix Table A-9)[74]. The second step was to express this series of gross investment in terms of constant prices. The following indices were used to construct a deflator[75]:

1. 1882-1959: U.K. price index of machinery exports:

i) 1882-1920: the average price index of U.K. exports of machinery obtained by dividing values of such exports in each year by the corresponding volume index[76].

ii) 1920-1938: H.J.D. Cole's Price index of U.K. exports of Agricultural Machinery[77].

iii) 1938-1959: U.K. Price index of "Machinery and Transport Equipment", previously reported as "Metal Goods and Engineering Products"[78].

2. 1959-1967: Britain during this period was no longer the principal exporter of machinery to Egypt. After 1952 there was a marked shift in the direction of trade and

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74. Based on my classification of Egypt's imports as reported by: Department of Statistics and Census, Annual Statement of Foreign Trade, various issues and C.A.P.M.S., The Development of Foreign Trade During the 5-Year Plan, Cairo, 1967. The assumption that all machines are imported is true in the Egyptian case. However, a domestic tractor plant started production by 1962 on a very limited scale. The value of output of this plant was added to imports of tractors to obtain the total tractor supply.

75. For the basic indices used in the deflator see Appendix Table A-1.

76. Figures on the value (at current prices) of U.K. Exports of "Machinery" from B.R. Mitchell and P. Deane, Abstract of British Historical Statistics, Cambridge, 1962, Table 8, pp.304-5; and volume (1913=100) from Werner Scholte, British Overseas Trade from 1700 to the 1930's, Oxford, 1952, Table 16, pp.153-4.

77. H.J.D. Cole, "Machinery Prices Between the Wars", Bulletin of the Oxford University Institute of Statistics, Vol.13, No.3, March, 1951, Table I, p.84.

78. U.K., Central Statistical Office, Annual Abstract of Statistics, various issues.

the U.S.S.R., Eastern Europe and West Germany became the major suppliers of capital goods to Egypt. The U.K. export price index became, therefore, less representative of changes in the prices of imported machinery. Instead, I used as a deflator for this period the price index of Egyptian imports of "Machinery, Electric Apparatus, and their Parts", which is a weighted average of the prices of capital goods imported from the different exporting countries[79].

The deflated series for GFCF in agricultural machinery was expressed at constant 1960 prices. NFCF for each year was calculated by allowing for depreciation, using the straight-line method, and assuming a depreciation rate of 5% per annum. This rate is a weighted average of the depreciation rates used by the Ministry of Agriculture for tractors (8%), and other machinery, mainly irrigation pumps (3% - 4%)[80], with weights based on the value of each category reported by the three Agricultural Censuses of 1939, 1950 and 1961[81].

GFCS and NFCS at the end of each year were calculated according to the perpetual inventory method outlined in Chapter I (section 1.4). However, the estimation of the initial stock presented a problem. No data on imports of agricultural machinery existed before 1906, yet qualitative evidence suggests the use, on a limited scale, of such machinery before that date especially on large estates. Therefore, I assumed that

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79. C.A.P.M.S., The Development of Foreign Trade During the Five-Year Plan, 1960-65, and the years 1965/66 and 1966/67, Cairo, 1968, p.75.

80. According to the Ministry of Agriculture "The value of depreciation for irrigation machines and for tractors is estimated on the basis of the purchase value of the machine or tractor, average age, and scrap value at the end of its life. Irrigation machines are divided into steam engines depreciated in 35 years, and petrol, diesel and solar engines depreciated in 25 years. Tractors are depreciated in 12 years"; Department of Statistics and Census, National Income from the Agricultural Sector, 1958-60, Cairo, p.17.

81. Ministry of Agriculture, General Agricultural Census, 1939, (Cairo 1946), 1950 (Cairo 1958) and 1961 (Cairo 1966).

Table 2.5

Capital Formation and Capital Stock in Agricultural Machinery

1906 - 1967

£.E. million

Year	GFCF at current prices (1)	Price Deflator 1960=100 (2)	GFCF at constant 1960 prices (3)	GFCS at End of Year, 1960 Prices (4)	Depreciation (5% per year) (5)	NFCF (6)	NFCS (7)
1905				7.000			3.3
1906	0.282	14.8	1.905	8.555	0.428	1.5	4.8
7	0.296	15.6	1.897	10.102	0.505	1.4	6.2
8	0.204	15.5	1.316	11.068	0.553	0.8	7.0
9	0.196	16.0	1.225	11.943	0.597	0.6	7.6
1910	0.121	15.9	0.761	12.354	0.618	0.1	7.7
11	0.178	16.2	1.099	13.103	0.655	0.4	8.1
12	0.221	16.5	1.339	14.092	0.705	0.6	8.7
13	0.319	17.3	1.844	15.586	0.779	1.1	9.8
14	0.383	19.1	2.005	17.241	0.862	1.1	10.9
15	0.049	22.7	0.216	17.107	0.855	-0.6	10.3
16	0.049	23.2	0.211	16.968	0.848	-0.6	9.7
17	0.030	27.6	0.109	16.727	0.836	-0.7	9.0
18	0.038	33.3	0.114	16.491	0.825	-0.7	8.3
19	0.053	38.7	0.137	16.278	0.814	-0.7	7.6
1920	0.271	45.6	0.594	16.522	0.826	-0.2	7.4
21	0.175	48.7	0.359	16.531	0.827	-0.5	6.9
22	0.084	31.2	0.269	16.450	0.823	-0.6	6.3
23	0.100	31.0	0.323	16.423	0.821	-0.5	5.8
24	0.168	31.3	0.537	16.610	0.831	-0.3	5.5
25	0.334	29.6	1.128	17.388	0.869	0.3	5.8
26	0.250	30.7	0.814	16.297	0.815	0.0	5.8
27	0.158	28.8	0.549	14.949	0.747	-0.2	5.6
28	0.277	29.8	0.930	14.563	0.728	0.2	5.8
29	0.382	29.2	1.308	14.646	0.732	0.6	6.4
1930	0.328	30.2	1.086	14.971	0.749	0.3	6.7
31	0.275	29.5	0.932	14.804	0.740	0.2	6.9
32	0.222	29.5	0.753	14.218	0.711	0.0	6.9
33	0.169	29.3	0.577	12.951	0.648	-0.1	6.8
34	0.194	28.8	0.674	11.620	0.581	0.1	6.9
35	0.236	24.9	0.948	12.352	0.618	0.3	7.2
36	0.227	24.5	0.927	13.068	0.653	0.3	7.5
37	0.322	23.7	1.359	14.318	0.716	0.6	8.1
38	0.316	25.4	1.244	15.448	0.772	0.5	8.6
39	0.268	25.9	1.035	16.346	0.817	0.2	8.8
1940	0.232	31.2	0.744	16.496	0.825	-0.1	8.7
41	0.198	34.8	0.569	16.706	0.835	-0.3	8.4
42	0.164	39.8	0.412	16.849	0.842	-0.4	8.0
43	0.131	43.1	0.304	16.830	0.842	-0.5	7.5
44	0.368	43.4	0.848	17.141	0.857	0.0	7.5
45	0.514	43.1	1.193	17.206	0.860	0.3	7.8
46	0.661	49.0	1.349	17.741	0.887	0.5	8.3
47	0.808	56.3	1.435	18.627	0.931	0.5	8.8
48	1.889	60.9	3.102	20.799	1.040	2.1	10.9
49	1.687	62.9	2.682	22.173	1.109	1.6	12.5
1950	2.827	65.5	4.316	25.403	1.270	3.0	15.5
51	3.688	74.0	4.984	29.455	1.473	3.5	19.0
52	2.532	82.5	3.096	31.771	1.589	1.5	20.5
53	1.537	83.2	1.847	33.041	1.652	0.2	20.7
54	2.040	83.8	2.434	34.801	1.740	0.7	21.4
1955	2.585	85.9	3.009	36.862	1.843	1.2	22.6
56	3.197	88.9	3.596	39.531	1.977	1.6	24.2
57	3.130	92.9	3.369	41.541	2.077	1.3	25.5
58	3.062	96.0	3.190	43.487	2.174	1.0	26.5
59	4.086	98.0	4.169	46.621	2.331	1.8	28.3
1960	3.300	100.0	3.300	49.177	2.459	0.8	29.1
61	3.470	125.0	2.776	51.384	2.569	0.2	29.3
62	8.136	114.0	7.137	58.109	2.905	4.2	33.5
63	10.188	120.0	8.490	66.295	3.315	5.2	38.7
64	8.556	141.0	6.068	71.515	3.576	2.5	41.2
65	6.426	165.0	3.895	75.217	3.761	0.1	41.3
66	6.416	127.0	5.052	78.920	3.946	1.1	42.4
67	7.571	149.0	5.081	82.566	4.128	1.0	43.4

GFCS at the end of 1905 was something like £E.1m. at current prices, or £E.7m at 1960 prices. There are rough indications that this "guesstimate" is probably about the correct order of magnitude; a) the implied assumption that average annual gross investment amounted to £E.50,000 (at current prices) over the previous 20 years, does not seem implausible in view of the fact that the comparable figure for 1906-10, when investment was much higher, ranged from £E.100,000 - 300,000; and b) the percentage change of GFCS (at constant prices) between 1899 and 1912 (288%) is very close to that of the horse-power equivalent of irrigation pumps during the same period (300%)[82].

Finally, initial NFCS at the end of 1905 was obtained by first cumulating GFCF (assumed here to have been at the constant level of £E.0.350m. at 1960 prices) over the assumed length of life (20 years), and then deducting cumulated depreciation, all at constant 1960 prices. Table 2-5 shows the resulting estimates of CF and CS in modern agricultural machinery.

B. Traditional Machinery: The other component of agricultural machinery is machines and implements domestically produced. These are simple traditional tools used for watering, ploughing and levelling the land, and for threshing the crop. For the Fellah "there is scarcely any question of carts and wagons, let alone tractors, reapers, binders and threshing machines"[83].

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82. Figures on horse-power from Table 2-2 above.
83. H.H. Ayrout, The Egyptian Peasant, op. cit., p.53.

As mentioned earlier, the only source of data on this type of machinery is the Agricultural Censuses taken in 1939, 1950 and 1961. The first step was to estimate GFCS at the end of these three benchmark years. This was obtained by multiplying the number of each type of machinery by their 1960 market prices (Appendix Table A-8). Figures for the intervening years between each two successive censuses were obtained by simple interpolation. The problem was to extend the estimate of GFCS to cover pre-censal years, i.e. before 1939, where no inventories of traditional machinery were available. One way of doing this is to extrapolate the 1939 GFCS backward assuming that the 1939 "Capital -- land ratio" (value of traditional machinery per unit of cultivated area (feddan)) has been constant over the previous years. But such an overall "Capital-land" ratio makes little sense. Capital intensity is more likely to be a function of the size of farm rather than total area cultivated; higher on large farms and lower on small plots. As data on cultivated land by size of farm are not available[84], I had to use other indicators for the extrapolation of the capital stock. I divided traditional machinery into two broad categories: a) watering (including all irrigation equipment), and b) others (including machines used for ploughing and levelling of land, gathering and threshing crops... etc.). The first category was related to changes

84. The only available distribution of cultivated area is by size of ownership which is a different concept altogether; See G. Baer, A History of Land Ownership in Modern Egypt, 1800-1950, Oxford, 1962.

in the length of irrigation canals and the second to changes in rural population[85]. The association between watering machinery and the length of irrigation canals needs hardly any explanation. The use of rural population can be justified on the grounds that in the context of Egyptian agriculture where the factor of production (land) is constant, another (labour) is growing, the third (traditional machinery) is most likely to be complementary to labour and substitute, together with fertilizers, for land. Moreover, the trend of change in the gross stock of traditional machinery during the period 1940-60, was reasonably close to that of rural population.

Here again, estimates of GFCF and scrapping, NFCF and depreciation, and NFCS were derived following the same methods as in the case of "Dwellings and Farm Buildings" and "Livestock", but assuming an average length of life of ten years for traditional machinery[86]. This estimate represents a weighted average of the length of life of the different types of traditional machinery implied by the depreciation rates employed for these assets in estimating national income in the agricultural sector in Egypt[87]. Weights were calculated as the shares of the different types of machinery in the gross stock in the three benchmark years, 1939, 1950 and 1961. Differences in the weighted averages for these years were too negligible to warrant any change in the depreciation rate over time.

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85. Data on the length of irrigation canals from Table 2-2, and on rural population, Appendix Table A-3.

86. For details of these methods refer to section 2.3.3 above.

87. Department of Statistics and Census, National Income from Agriculture, 1958-1960, Cairo, 1962, pp.186-7.

Table 2-6

Capital Formation and Capital Stock in Agricultural Traditional Machinery, 1882-1967

£E. million

	GFCS at End of Year	Scrapping	GFCF	Depreciation (10% per year)	NFCF	NFCS
	(1)	(2)	(3)	(4)	(5)	(6)
1882	2.675					1.530
83	2.719	0.237	0.281	0.272	0.009	1.539
84	2.765	0.243	0.289	0.277	0.012	1.551
85	2.812	0.250	0.297	0.281	0.016	1.567
86	2.866	0.257	0.311	0.287	0.024	1.591
87	2.926	0.265	0.325	0.293	0.032	1.623
88	2.990	0.271	0.335	0.299	0.036	1.659
89	3.048	0.278	0.336	0.305	0.031	1.690
1890	3.139	0.286	0.377	0.314	0.063	1.753
91	3.248	0.293	0.402	0.325	0.080	1.833
92	3.334	0.300	0.386	0.333	0.053	1.886
93	3.423	0.305	0.394	0.342	0.052	1.938
94	3.493	0.311	0.381	0.349	0.032	1.970
95	3.556	0.317	0.380	0.356	0.024	1.994
96	3.615	0.324	0.383	0.362	0.021	2.015
97	3.671	0.330	0.386	0.367	0.019	2.034
98	3.719	0.337	0.385	0.372	0.013	2.047
99	3.767	0.343	0.391	0.377	0.014	2.061
1900	3.815	0.349	0.397	0.382	0.015	2.076
01	3.864	0.356	0.405	0.386	0.019	2.095
02	3.958	0.362	0.456	0.396	0.060	2.155
03	4.046	0.368	0.456	0.405	0.051	2.206
04	4.138	0.374	0.466	0.414	0.052	2.258
05	4.216	0.380	0.458	0.422	0.036	2.294
06	4.296	0.386	0.466	0.430	0.036	2.330
07	4.395	0.392	0.491	0.440	0.051	2.381
08	4.448	0.399	0.452	0.445	0.007	2.388
09	4.619	0.405	0.576	0.462	0.114	2.502
1910	4.788	0.412	0.581	0.479	0.102	2.604
11	4.960	0.419	0.591	0.496	0.095	2.699
12	4.973	0.425	0.438	0.497	-0.059	2.640
13	4.960	0.497	0.484	0.496	-0.012	2.628
14	4.947	0.497	0.484	0.495	-0.011	2.617
15	4.934	0.497	0.484	0.493	-0.009	2.608
16	4.950	0.497	0.513	0.495	0.018	2.626
17	5.011	0.497	0.558	0.501	0.057	2.683
18	5.043	0.497	0.529	0.504	0.025	2.708
19	5.061	0.497	0.515	0.506	0.009	2.717
1920	5.095	0.497	0.531	0.510	0.021	2.738
21	4.996	0.497	0.398	0.500	-0.102	2.636
22	5.002	0.497	0.503	0.500	0.003	2.639
23	5.031	0.500	0.529	0.503	0.026	2.665
24	5.070	0.500	0.539	0.507	0.032	2.697
25	5.106	0.500	0.536	0.511	0.025	2.722
26	5.143	0.500	0.537	0.514	0.023	2.745
27	5.182	0.500	0.539	0.518	0.021	2.766
28	5.229	0.500	0.547	0.523	0.024	2.790
29	5.279	0.500	0.550	0.528	0.022	2.812
1930	5.316	0.500	0.537	0.532	0.005	2.817
31	5.366	0.500	0.550	0.537	0.013	2.830
32	5.413	0.500	0.547	0.541	0.006	2.836
33	5.461	0.519	0.567	0.546	0.021	2.857
34	5.546	0.524	0.609	0.555	0.054	2.911
35	5.618	0.529	0.595	0.561	0.034	2.945
36	5.693	0.533	0.580	0.569	0.011	2.956
37	5.793	0.538	0.674	0.579	0.095	3.051
38	5.777	0.543	0.627	0.578	0.049	3.011
39	5.824	0.549	0.596	0.582	0.014	3.025
1940	6.075	0.553	0.804	0.608	0.196	3.221
41	6.325	0.558	0.808	0.633	0.175	3.396
42	6.576	0.564	0.815	0.658	0.157	3.553
43	6.826	0.577	0.827	0.683	0.144	3.697
44	7.077	0.595	0.846	0.708	0.138	3.835
45	7.327	0.613	0.883	0.733	0.130	3.965
46	7.578	0.631	0.882	0.758	0.124	4.089
47	7.828	0.649	0.899	0.783	0.116	4.205
48	8.079	0.667	0.918	0.808	0.110	4.315
49	8.329	0.685	0.935	0.833	0.102	4.417
1950	8.580	0.703	0.954	0.858	0.096	4.513
51	8.800	0.721	0.941	0.880	0.061	4.574
52	9.020	0.739	0.959	0.902	0.057	4.631
53	9.240	0.803	1.023	0.924	0.099	4.730
54	9.460	0.825	1.045	0.946	0.099	4.829
55	9.680	0.847	1.067	0.968	0.099	4.928
56	9.900	0.869	1.089	0.990	0.099	5.027
57	10.120	0.891	1.111	1.012	0.099	5.126
58	10.340	0.913	1.133	1.034	0.099	5.225
59	10.560	0.935	1.155	1.056	0.099	5.324
1960	10.780	0.957	1.177	1.078	0.099	5.423
61	11.002	0.979	1.201	1.100	0.101	5.524
62	11.222	1.001	1.221	1.122	0.099	5.623
63	11.442	1.023	1.243	1.144	0.099	5.722
64	11.662	1.045	1.265	1.166	0.099	5.821
65	11.882	1.067	1.287	1.188	0.099	5.920
66	12.102	1.089	1.309	1.210	0.099	6.019
67	12.322	1.111	1.331	1.232	0.099	6.118

Table 2-7

Total Net Fixed Capital Formation and Capital Stock in Agricultural Machinery, 1882-1967

(constant 1960 Prices)*

£E. million

Year	NFCF	NFCS	Year	NFCF	NFCS	Year	NFCF	NFCS
1882	-	1.5	1910	0.2	10.3	1939	0.2	11.8
83	0.0	1.5	11	0.5	10.8	40	0.1	11.9
84	0.1	1.6	12	0.5	11.3	41	-0.1	11.8
85	0.0	1.6	13	1.1	12.4	42	-0.2	11.6
86	0.0	1.6	14	1.1	13.5	43	-0.4	11.2
87	0.0	1.6	15	-0.6	12.9	44	0.1	11.3
88	0.1	1.7	16	-0.6	12.3	45	0.5	11.8
89	0.0	1.7	17	-0.6	11.7	46	0.6	12.4
1890	0.1	1.8	18	-0.7	11.0	47	0.6	13.0
91	0.0	1.8	19	-0.7	10.3	48	2.2	15.2
92	0.1	1.9	1920	-0.2	10.1	49	1.7	16.9
93	0.0	1.9	21	-0.6	9.5	1950	3.1	20.0
94	0.1	2.0	22	-0.6	8.9	51	3.6	23.6
95	0.0	2.0	23	-0.4	8.5	52	1.5	25.1
96	0.0	2.0	24	-0.3	8.2	53	0.3	25.4
97	0.0	2.0	25	0.3	8.5	54	0.8	26.2
98	0.0	2.0	26	0.0	8.5	55	1.3	27.5
99	0.1	2.1	27	-0.1	8.4	56	1.7	29.2
1900	0.0	2.1	28	0.2	8.6	57	1.4	30.6
01	0.0	2.1	29	0.6	9.2	58	1.1	31.7
02	0.1	2.2	1930	0.3	9.5	59	1.9	33.6
03	0.0	2.2	31	0.2	9.7	1960	0.9	34.5
04	0.1	2.3 (a)	32	0.0	9.7	61	0.3	34.8
05	0.0	2.3 (a)	33	0.0	9.7	62	4.3	39.1
		5.6 (b)	34	0.1	9.8	63	5.3	44.4
06	1.5	7.1	35	0.3	10.1	64	2.6	47.0
07	1.5	8.6	36	0.4	10.5	65	0.2	47.2
08	0.8	9.4	37	0.6	11.1	66	1.2	48.4
09	0.7	10.1	38	0.5	11.6	67	1.1	49.5

* Sums of columns (6) and (7) of Tables 2-5 and 2-6. Minor discrepancies due to rounding.

a) Excluding modern machinery. Comparable with earlier years.
b) Including modern machinery. Comparable with later years.

Table 2-6 shows the estimates of capital formation and Capital Stock in "Traditional Machinery", and Table 2-7 provides a summary of the estimates for total agricultural machinery, i.e. modern plus traditional.

2.6 Summary of Results

Table 2.8 provides a summary view of C.S. and C.F. in Egyptian agriculture over the period 1882-1967. Figures in the table represent the aggregate value of the different items of fixed capital in agriculture; irrigation and drainage, rural dwellings and farm buildings, livestock and machinery. Data on the rate of growth, composition and structural change of agricultural capital are to be found in Chapter 4 [Table 4-1] where all these aspects are discussed in detail.

Table 2-8

Total Capital Formation and Capital Stock in Egyptian Agriculture, 1882-1967

(Constant 1960 Prices)

£E. million

Year	NFCF	NFCS	Year	NFCF	NFCS	Year	NFCF	NFCS
1882	-	97.9	1910	-0.3	223.3	1939	16.3	480.3
83	1.5	99.4	11	2.7	226.0	40	0.8	481.1
84	1.5	100.9	12	2.4	228.4	41	-1.3	479.8
85	1.7	102.6	13	4.4	232.8	42	8.5	488.3
86	1.8	104.4	14	-0.4	232.4	43	7.1	495.4
87	3.1	107.5	15	-2.2	230.2	44	6.5	501.9
88	3.2	110.7	16	-1.3	228.9	45	5.5	507.6
89	2.0	112.7	17	8.4	237.3	46	19.8	527.4
1890	3.3	116.0	18	0.5	237.8	47	17.6	545.0
91	2.9	118.9	19	0.4	238.2	48	-3.5	541.5
92	1.8	120.7	1920	5.4	243.6	49	-3.0	538.5
93	1.3	122.0	21	7.8	251.4	1950	2.6	541.1
94	1.4	123.4	22	-3.2	248.2	51	-2.1	539.0
95	1.2	124.6	23	4.1	252.3	52	0.7	539.7
96	1.3	125.9	24	8.7	261.0	53	8.4	548.1
97	4.4	130.3	25	1.0	262.0	54	12.6	560.7
98	2.1	132.4	26	7.3	269.3	55	17.8	578.5
99	3.2	135.6	27	4.7	274.0	56	12.6	591.1
1900	1.6	137.2	28	7.7	281.7	57	9.6	600.7
01	6.9	144.1	29	12.0	293.7	58	8.9	609.6
02	12.4	156.5	1930	16.1	309.8	59	16.3	625.9
03	11.5	168.0	31	15.8	325.6	1960	18.0	643.9
04	5.1	173.1	32	22.0	347.6	61	21.0	664.9
05	8.6	181.7 (a)	33	16.0	363.6	62	49.2	714.1
		185.0 (b)	34	23.0	386.6	63	53.0	767.1
06	16.5	201.5	35	18.2	404.8	64	62.4	829.5
07	10.4	211.9	36	18.0	422.8	65	44.5	874.0
08	6.8	218.7	37	29.6	452.4	66	37.9	911.9
09	4.9	223.6	38	11.6	464.0	67	34.9	946.8

(a) Excluding machinery.

(b) Including machinery.

CHAPTER THREE

CAPITAL FORMATION IN EGYPTIAN INDUSTRY, 1899 - 1967

3.1 Introduction

In this chapter I attempt an estimate of fixed capital formation (FCF) in the industrial sector of Egypt for the period 1899-1967. Conceptually, a measure of FCF should include all goods produced for use in processes for future production - machinery, equipment, plants, buildings, other constructions and works[1]. A wide range of problems and difficulties are encountered when translating this concept into measurable quantities especially for underdeveloped countries like Egypt. These problems are even greater than those of estimating CF in agriculture where "real capital takes on a few specific, quite homogeneous forms which are relatively easy to measure physically, such as fertilizers, canals and drains, pumps, etc. The various items of capital can therefore be dealt with individually.... It is otherwise in industry, where productive equipment is infinitely more differentiated, even in a relatively new industry such as the Egyptian".[2]

The choice of one or the other of the alternative methods of measuring CF in industry depends upon the availability and reliability of statistical data and the purposes of measurement.

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1. U.N., Concepts and Definitions of Capital Formation, Statistical Papers, Series F., No. 3, N.Y., 1953, p.7.

2. B. Hansen and G.A. Marzouk, Development and Economic Policy in the U.A.R. (Egypt), Amsterdam, 1965, p.128.

This accounts in great part for the diversity of methods used in different studies of CF. In developed countries, where the industrial sector is highly organised, it is possible to estimate CF using the flow-of-funds approach. Productive units, usually of a large size, keep regular and detailed accounts of their assets. Thus statisticians can estimate NCF as the depreciated value of fixed assets declared in the companies' accounts. Examples of this approach can be found in studies by Creamer and others[3] for the U.S.A. (1870-1953) based on periodic Industrial Censuses of comprehensive coverage, and that by Feinstein[4] for the U.K. (1920-1938) based on a sample of company accounts in the different groups of industries. An alternative method of estimating CF in developed countries is based on fire-insurance valuations of assets to obtain a measure of the replacement cost of these assets. Barna[5] has used this method to estimate the Capital Stock of fixed assets in British manufacturing in 1955. Such methods are not appropriate for most underdeveloped countries where poor data lead us to sacrifice the accuracy for the elegance of method.[6] This explains the tendency for most estimates of CF in underdeveloped countries to be based upon the commodity flow approach. Since a substantial amount of capital goods is imported, and foreign trade statistics are relatively well developed in these

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3. D. Creamer, S.P. Dobrovolsky and I. Borenstein, Capital in Manufacturing and Mining: Its Formation and Financing, N.B.E.R., Princeton, 1960.

4. C.H. Feinstein, Domestic Capital Formation in the U.K: 1920-1938, Cambridge University Press, 1965, pp.27-30 and, for comparison with other estimates for U.K. pp. 238-259.

5. T. Barna, "The Replacement Cost of Fixed Assets in British Manufacturing Industry in 1955", Journal of the Royal Statistical Society, Series A (General), Vol. 120, 1957.

6. R.W. Hooley, "The Measurement of Capital Formation in Underdeveloped Countries", Review of Economics and Statistics, Vol.49, No. 2, May 1967.

countries, this source of information, together with accessible data on the domestic production of capital goods, are used in preparing estimates of CF from the supply side.[7]

3.2 Previous Attempts to Measure CF in Egyptian Industry

For Egypt, the lack of long-term estimates of CF supports Hansen's view that "the role played by real aggregate capital in the process of growth is quite uncertain and not very well understood".[8] National income studies for Egypt did not try to estimate CF but defined this aggregate as a residual derived by subtracting the value of consumption from the corresponding value of national product.[9] However, attempts have been made to measure CF in Egyptian industry mostly covering the post-war period. Methodologically, these attempts fall broadly into three categories. First, studies based on figures of financial capital invested in industrial establishments, as shown by the balance sheets of joint-stock companies. Second, estimates of motive power, as represented by the horse-power equivalent of industrial machines. Third, attempts based on the commodity-flow approach. These estimates vary greatly in quality, scope, and coverage, and all leave much to be desired towards providing a definitive series of CF. However, a close examination of available completed work will indicate the boundaries of knowledge

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7. See for example, B. Ramamurti and H. Th. Peddersen, "Statistical Methods of Estimating Capital Formation Expenditure in E.C.A.F.E. Countries", in Asian Studies in Income and Wealth Asia Publishing House, London, 1965, and Hooley, op.cit.,

8. Hansen and Marzouk, op.cit., p.128.

9. S.H. Abdel Rahman, A Survey of the Foreign Trade of Egypt in the Postwar Period, with special reference to its impact on the national economy, unpublished Ph.D. thesis, Faculty of Commerce, Cairo University, 1959, Appendix C, p.356.
M.A. Anis, "A Study of the National Income of Egypt", L'Egypte Contemporaine, Nos. 261-62, November-December 1950,
B. Hansen and D. Mead, "The National Income of the U.A.R. (Egypt) 1939-62", Memo. no. 355, Institute of National Planning, Cairo, 1963, and

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and define the areas left uncovered.

3.2.1 'Financial Capital' Estimates

Industrial capital is defined, in these estimates, as the total of paid-up capital of industrial companies operating in Egypt. Paid-up capital is defined as the initial equity capital with which the enterprise started, plus any net change that has taken place in its amount up to the end of a year. It should correspond approximately to the capital invested in the establishment by the owners themselves in the form of fixed or liquid assets but these estimates exclude capital provided by borrowing, and accumulated reserves which are normally invested in the enterprise.

Data on 'financial capital' of the joint-stock companies operating in Egypt date as far back as 1883. The earliest detailed record I traced was the "List of Financial, Manufacturing, Transport and other Companies Established in Egypt", compiled and published by the British Chamber of Commerce of Egypt in Alexandria which first appeared in 1899, and consecutive revised editions in 1901, 1905 and 1907.[10] The 'List' provides us with a comprehensive survey of the joint stock companies operating in the different economic activities; their names, date of foundation, paid-up capital and debentures, and reserves. But the List does not cover the assets and liabilities of the non-corporate sector of the economy.

In 1909 the Statistical Department published the first issue

.....B. Hansen, "Planning and Economic Growth in the U.A.R., 1960-65." in P.J. Vatikiotis (ed.), Egypt since the Revolution, London 1968, pp.19-39.

10. The British Chamber of Commerce of Egypt, Alexandria, List of Financial, Manufacturing, Transport and other Companies Established in Egypt, Alexandria, 1899, 1900, 1901, 1905, 1907.

of the "Statistique des Sociétés Anonymes Par Action Travaillant Principalement en Egypte" giving the position at the end of 1907. It continued on an irregular basis until 1939 when it became annual.[11] The gaps not covered by the 'Statistique des S.A.' were filled by the valuable works of E. Papasian "Annuaire de la Finance Egyptienne"[12], and E.I. Politi "Annuaire des Sociétés Egyptiennes par actions"[13]. These sources provided more or less the same information as the 'List', until 1941, when the Statistical Department published the first enlarged and improved edition of the "Statistique des S.A." In its new form this edition provided information on every joint-stock company concerning its activities, growth of invested capital, analysis of the balance sheet and final accounts, loans, prices of shares and profits. A summary of this has been published annually in the 'Annuaire Statistique' and in the 'Economic Bulletin of the National Bank of Egypt' for the period 1951-1959.[14]

Finally, the Censuses of Industrial Production adopt the same concept of capital and publish data on the financial capital invested in industrial establishments employing 10 workers and more. These figures are based on information declared by business establishments to the Department of Commercial and Industrial

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11. Statistical Department, Joint-Stock Companies Operating Chiefly in Egypt, December 31st, 1907, Cairo, 1909, then became: Department De La Statistique, Statistique des Sociétés Anonymes par Actions Travaillant Principalement en Egypte, Cairo, 1911, then 1925, and every three years up to 1938, then annual since 1939, and in Arabic since 1941.

12. E. Papasian, Annuaire de la Finance Egyptienne, 1907-1926, and L'Egypte Economique et Financière, 1926.

13. E.I.Politi, Annuaire des Sociétés Egyptiennes par Actions, Cairo, 1931-1952.

14. National Bank of Egypt, Economic Bulletin, under the title "Company Finance in Egypt", Cairo, 1951-1959.

Property Registration' about their paid-up capital and any change therein.[15]

Adopting a 'financial capital' approach, and drawing on these sources, Crouchley made his study of the "Investment of Foreign Capital in Egyptian Companies and the Public Debt." published in 1936.[16] He estimated capital invested in Egypt (1883-1933) as the sum of paid-up capital and debentures of the joint-stock companies. Hamdy repeated the exercise in his "Statistical Survey of the Development of Capital Investment in Egypt since 1880".[17]

This approach and studies based on it, are subject to severe limitations. First, the concept of capital used could be very misleading. Paid-up capital declared by the company does not necessarily represent the real value of its assets. A downward bias results from the unjustified practice of excluding from capital the accumulated reserves and medium-and long-term loans which are normally invested in the enterprise.[18] Secondly, another downward bias also arises from the exclusion of small-scale establishments from the estimates. But such enterprises were important in Egypt especially in the earlier years of our period when industry was dominated by small workshops and handicraft.[19]

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15. Egypt, Department of Statistics and Census, Industrial and C ommercial Census, 1927-1937, 1947 and Census of Industrial Production, 1944, 1947, 1950, 1952, 1954; annual since 1956. (From 1962 onwards there is also a quarterly survey of all firms employing 50 or more workers).

16. A.E. Crouchley, The Investment of Foreign Capital in Egyptian Companies and Public Departments, Ministry of Finance, Technical Paper, No. 12, Cairo, 1936.

17. M.M. Hamdy, A Statistical Survey of the Development of Capital Investment in Egypt Since 1880, unpublished Ph.D. thesis, University of London, London, 1943, pp.251-322.

18. U.N., Department of Economic and Social Affairs, The Development of Manufacturing Industry in Egypt, Israel and Turkey, N.Y., 1958, p.113.

19. In 1937, establishments employing less than 5 workers accounted for 92% of the total number of industrial establishments, see Department of Statistics and Census, Industrial and Commercial Census of 1937, op.cit., Ten years later, Abu Ismail estimated

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Thirdly, changes in the value of paid-up capital do not necessarily indicate real changes in the value of the assets as much as fluctuations in the market value of the company's shares. Thus the 1907 crisis in Egypt revealed that such fluctuations were due largely to speculative forces in the 'Bourse' when speculators sought "to acquire shares in the companies in order to unloan them at a profit. They bought at ever-increasing prices and sold again at still higher prices.... It became highly profitable to promote companies merely to unload the new shares at a high premium on a feverish and greedy market. In 1905 and 1906 a great number of companies were formed, to deal in land, to develop estates, for vague, unidentified purposes, even with no defined object at all".[20]

Fourthly, the 'Industrial Census' results concerning capital are highly unreliable. Their limited coverage (only 72% of establishments employing 10 or more workers reported their paid-up capital in 1937 Census), and reluctance of industrial establishments to communicate particulars of their business for fear of revealing their real situation to the Tax Department, rendered the information collected on capital in the three Censuses (1937, 1947, 1950) so unsatisfactory that their collection was dropped after 1950.[21]

It could be concluded, therefore, that estimates of CF based on the declared values of paid-up capital are subject to very serious limitations and biases that could grossly distort the results of any analysis based upon them.[22]

.....that the capital invested in establishments employing less than 10 workers represented 50% of total capital invested in industry; A. Abu Ismail, The Structure of Manufacturing Industry Higher Institute of Arab Studies, League of Arab States, Cairo, 1959, pp.125-140. These measures should be regarded as rough pointers of magnitude rather than accurate estimates.

20. A.E. Crouchley, "Investment....", op.cit., p.62.

21. U.N., The Development of Manufacturing Industry....., op.cit., p.113.

22. Ramamurti and Pedersen, op.cit., p.121.

3.2.2. 'Motive-Power' Estimates

According to this approach, the magnitude and development of industrial capital is expressed in terms of an indirect indicator; the horse-power equivalent of machines used in the sector. For Egypt, information on motive power was gathered in the 1944, 1947 and 1950 Censuses of Industrial Production, but this was discontinued because the material previously collected was considered unreliable and because it was deemed impossible to obtain more accurate information within the framework of such Censuses. Other data are, however, available on mechanical power used by public and private establishments of all sizes and these give the licensed motive power used by branches of industries at the end of each year.[23]

These data, published annually by the 'Annuaire Statistique', are detailed for some branches of industry but not for others, and their classifications by industries does not coincide with the ISIC.[24] The 1950 Census data for major groups (apparel, petroleum and coal, metal products and textiles), seem to contain gross errors.[25] Moreover, motive power data relate to major groups and exclude units engaged in repair work. More important, they include nearly all establishments with 10 workers or more, but fail to cover smaller establishments. The 1950 production Census, for instance, covered 16,252 establishments with less than 10 workers

23. D.C. Mead, Growth and Structural Change in the Egyptian Economy, Illinois, 1967, p.112, f.n. no. 14.

24. Department of Statistics and Census, Annuaire Statistique, 'Machines motrices ayant fait l'objet d'un permis de fonctionnement' several issues.

25. According to that census, horse power per worker amounted to 42.0 in the apparel industry, 24.7 in metal products and 0.2 in petroleum. These figures for textile and metals are too high while those for petroleum are too low where it is highly unlikely that horse power per worker had declined in the latter from 2.4 in 1947 to 0.2 in 1950.

which employed nearly 56,000 workers, but this was only about 16% of the total labour force in all establishments of that size.[26] Finally, data refer to licensed, and not to actual, motive power in use in industry.

To conclude: figures of motive power obtained by applying this approach do not, in any way, provide a measure of C.F. in industry. They provide a useful, but very rough, indicator of productive capacity in the sector.

3.2.3 The 'Commodity-Flow' Estimates

The third category of CF estimates available for Egyptian industry is based on the commodity-flow approach. Conceptually, CF is measured in terms of domestic production plus imports of capital goods less those, other than dwellings, sold to households or exported. Such estimates depend mainly on import statistics, together with whatever data are available on domestic production of capital goods.

This method of estimation involves identifying different items of imports as to their 'major expected use'. On the basis of the c.i.f. value of such imports an appropriate mark-up ratio is added to allow for distribution and installation costs since CF should be valued at cost to the ultimate user of the capital goods. To account for the domestic component of CF, an estimate of investment in construction is added to the derived value of imported machinery. This is usually done by adding another mark-up based on available data on the value of domestic construction activity. The outcome is a series of G.F.C.F. at current prices. This series is then deflated by an appropriate price index so that the adjusted data represent CF at constant prices. Adding annual investment figures

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26. U.N., The Development of Manufacturing Industry,... op.cit., p.110.

to an estimate of initial capital stock, and assuming a certain rate of depreciation, we then obtain a series of N.F.C.S. at constant prices.

The Permanent Council for the Development of National Production first attempted an aggregate measure of CF in Egypt for the year 1953[27]. Total G.F.C.F. for that year was estimated as the summation of the c.i.f. value of imported machines and equipment, an estimate of the value of new buildings (public and private) based on the taxes assessed on buildings actually completed during the year, and a 'guesstimate' of investment in irrigation and other capital goods. A more refined and improved estimate was made by S.H. Abdel-Rahman for the period 1945-53.[28] To the c.i.f. value of imported machinery, he added a 40% mark-up as "trade and transport margin", plus "the annual additions to the country's capital stock represented in building and construction, equipment and land reclamation" to obtain the value G.D.F.C.F. at current prices.

As the National Bank of Egypt Bulletin observed these two estimates "naturally have their limitations and should be regarded, in the absence of more reliable data, as a probable guess".[29] First, they are of a very limited value in comparative studies on a cross-section level or overtime as the value of CF is not adjusted, either to allow for price changes or for the wear and tear of assets. Secondly, the choice of the 40% trade and transport margin is exaggerated and arbitrary since it is estimated on the vague basis of "certain information collected from some importing agents."[30]

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27. Republic of Egypt, The Permanent Council for the Development of National Production, Report for 1955, Cairo, 1955, p.12.
28. S.H. Abdel-Rahman, op.cit., Appendix C, pp.356-365.
29. National Bank of Egypt, Economic Bulletin, "Gross Rate of Capital Formation in Egypt", Vol. IX, No. 1, 1956, p.22.
30. Abdel-Rahman, op.cit. p.360.

Thirdly, important activities such as rural building and construction and investment in infrastructure, are totally left out. Finally, since these estimates are broken down "by type of capital good" and not by "industrial use" they supply only a rough measure of the total magnitude of investment and fail to provide any insight into the structure and pattern of that investment.

Hansen and Marzouk[31] pioneered three attempts to measure the capital stock for Egyptian industry, 1939-1960. Mead[32] and Mabro[33], following essentially the same approach and drawing on the same data, improved on their figures through a more reasonable choice of the underlying assumptions.

As a starting point, Hansen and Marzouk posited the value of capital stock in manufacturing industry as being in the range of L.E. 30-40 million in 1939[34]. Although there is no explicit statement on how they reached these figures, I believe they based their estimate on the book value of capital assets shown in corporate balance sheets. Thus capital stock, as they measured it, was equal to paid-up capital plus reserves and provisions in companies employing 10 and more workers.[35] After choosing the

31. Hansen and Marzouk, op.cit., pp.128-9.

32. Mead, op.cit., pp.111-15.

33. R. Mabro, "Industrial Growth, Agricultural Underemployment and the Lewis Model: The Egyptian Case, 1937-65", The Journal of Development Studies, Vol. III, No. 4., July 1967, pp.340-1 and 350 (f.n. 45).

34. Hansen and Marzouk, op.cit., p.129.

35. This is based on their oblique reference, somewhere else in their book, that "paid-up capital reserves and provisions amounted to almost the same as the book-keeping value of the fixed assets plus stocks, which partly justifies the method we used in capital estimate", Ibid., p.145.

different base values for 1939 "real gross investment, less depreciations, were cumulated yearly to obtain the capital values at fixed prices for subsequent years".[36] The investment figures employed are those provided, at current prices, by the National Planning Committee and were derived by applying an 87.3% mark-up to the c.i.f. value of imported industrial machinery and equipment[37]; deflated by the Wholesale Price Sub-Index for Industrial Products and Materials (1939 = 100). Rates of depreciation of 5% and 7% were finally applied to the capital stock.

A fundamental weakness of the estimate is the choice of a domestic price index as a deflator. Such a deflator might add to price distortions rather than eliminating them. Mead found it more reasonable to use the price of capital goods exports from the U.K. as computed by the Board of Trade as an alternative deflator.[38] In Mead's view, this "seems like the best approach since most of capital goods are imported, and indeed, the investment series is constructed by applying a constant mark-up to the current value of capital-goods imports".[39] But the use of U.K. capital-goods price index as a deflator would not remove all sources of price distortions in the current-prices investment series for three reasons; first, it does not account for price

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36. Ibid., p.129.

37. U.A.R., Department of Statistics and Census, Ten Years of Revolution: Statistical Atlas, Cairo, July, 1962, Table 11. This table is based on mimeographed tables of the N.P.C. in which investment figures for industry are derived by applying an 87.3% mark-up to c.i.f. value of imported industrial machinery and equipment, while it is not mentioned how figures for other sectors were calculated.

38. Mead, op.cit., p.113.

39. Ibid., p.113.

changes of the domestic components of CF, and secondly, not all capital imports come from the U.K. and the U.K. export prices may not be a good measure of change in world prices of capital goods. Finally, the U.K. index covers only a portion of British capital-goods exports.

Mabro's estimate represents "an improvement on previous attempts because of the choice of a new deflator: a weighted average of the U.K. export price index (53%), the price index for building materials (25%), metals (10%) and the industrial money-wage index (12%)[40]. The choice of weights is based on the National Planning Committee (N.P.C.) assumption of a 53% share of imported machinery in total investment, and the distribution of the remaining 47% among construction, local purchase of equipment and fittings, and wages paid to builders and fitters used as a reference a personal experience[41]. As Mabro himself points out "there is an arbitrary element in the choice of these weights but there may be less approximation in our deflator than in Hansen and Marzouk's and Mead's"[42].

However, while the latter authors assume a number of alternative depreciation rates ranging from 4 - 7%, Mabro commits himself to the undoubtedly low rate of 5% implying an average age of total capital stock of 20 years in Egypt where wear and tear appears to be necessarily higher.

All three attempts are open to many kinds of criticism, many of which the authors were themselves only too well aware of[43]. In fact, they admit that "Rather than accurate absolute figures we may get a true idea of the trends in the capital-labour and the capital output ratios"[44].

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40. Mabro, op. cit., p.340.
41. Ibid., p.350.
42. Ibid., p.350.
43. Hansen and Marzouk, op. cit., p.128.
44. Mabro, op. cit., p.340.

3.3 Methods of Estimating Capital Formation and Capital Stock in Egyptian Industry, 1899-1967

The present estimates involved the following computations. First, estimates of GFCF at current and constant prices were performed. According to the commodity-flow approach, GFCF at current prices was assumed to be equal to the sum of gross investment in machinery (c.i.f. value of imported machinery and equipment, plus a 20% mark-up to account for trade margins and transport and installation costs) and domestic investment in building and construction (due to lack of data estimated as a mark-up of the value of machinery). The series of GFCF in machinery and buildings, thus obtained, was then expressed in terms of constant (1960) prices by deflating each by an appropriate price index. Secondly, NFCF was obtained by allowing for depreciation at an annual rate of 6.25% for machinery and 2% for buildings. Finally, estimates were made of the gross and net fixed capital stocks in the initial year, 1899, and stock figures for subsequent years were obtained according to the perpetual inventory method.

These steps are explained in detail in the following sections.

3.3.1 Gross Fixed Capital Formation

GFCF in industry, estimated on commodity-flow basis, is the summation of the c.i.f. value of capital goods imports plus a certain mark-up ratio for distribution and installation costs, and an estimate of investment in building and construction in the sector.

The starting point of the present estimate was to find out the value of industrial machinery, assumed here to be entirely

imported, over the period of study. Egypt's foreign trade statistics, traditionally more reliable and of better quality compared to other official statistics, provide fairly consistent and comparable data on the c.i.f. value of imports, as reported by the "Customs Authority", going as far back in time as the early 1880's[45].

However, in dealing with these figures, a number of difficulties were encountered. The first was one of allocation. All foreign trade publications provide a "list" of the different kinds of imports with no clue as to their distribution among the different sectors of the economy. Few capital goods can be identified as to their "end use" simply from their description. I, therefore, decided to classify imports by their "major expected use" i.e., identifying certain machinery and equipment with the sector most likely to be using them. The resulting classification is necessarily arbitrary, but in order to minimise arbitrariness, I tried to remain as close as possible to the "International Standard Trade Classification" (I.S.T.C.) and the "International Standard Industrial Classification of All Economic Activities" (I.S.I.C.)[46].

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45. 1882-83; U.K. Board of Trade, Statistical Abstract for the Foreign Countries, London, 1894.
1884-1917; Egypte, Direction General des Douanes, Le Commerce Extérieur de l'Egypte, Cairo, 1891, 1904 and subsequent years.
1917-1958; Egypt, Department of Statistics and Census, Annual Statement of Foreign Trade of Egypt, Cairo, various issues.
1959-1967; U.A.R., C.A.P.M.S., The Development of Foreign Trade During the Five-Year Plan for Economic and Social Development (July 1960-June 1965, and the year 1965/66, Ref. No. 20-600, Cairo, November 1967, pp.303-316.

46. U.N., Statistical Office, Commodity Index for the Standard International Trade Classification, Revised, Statistical Papers, Series M, No.38, N.Y., 1963, Vol.II, Sec.7, Division 71, 72, pp.33-5, and International Standard Industrial Classification of all Economic Activities, Statistical Papers, Series M, No.4, Rev.2, N.Y., 1968, p.26.

The second difficulty was one of pricing. Imports of capital goods are reported c.i.f. Allowance has to be made for trade, transport and installation costs thereby arriving at the cost to the ultimate purchaser of capital goods. In preparing estimates of C.F. in developing countries, such allowances are usually estimated by adding a percentage mark-up to the c.i.f. value of imports. As the experience of some Asian and Far Eastern countries shows, the methods of estimating this mark-up vary considerably. Sometimes, customs duties and domestic excise and sales taxes are estimated separately on the basis of information in the trade return or from customs tariffs and tax schedules. The additional allowances for dealers' mark-up are, in some estimates, based on enquiries with chambers of commerce or major importers or wholesalers. The allowances for transport and installation costs, etc. are always very roughly estimated. The majority of the estimates in the region do, however, add an overall percentage to c.i.f. and ex-factory values to allow for all these components. Sometimes this overall percentage is based on a one-time enquiry with dealers which is often outdated or suffers from the weakness that the sample of dealers from whom information was obtained was not entirely appropriate for the purpose. Great caution should be exercised in using these overall ratios as the different kinds of capital goods do not go through the same number of middlemen, and the number of middlemen also varies depending on the purchaser (government or private sector). Moreover, the rounded percentages used in some estimates appear to be arbitrary without having a basis in any enquiries at all and, in the absence of trade distribution surveys, the choice of these mark-ups might

"reach the borderline of fancy introducing, therefore, biases of substantial magnitude"[47].

In the absence of any systematic data on trade and distribution services in Egypt, my estimate of the mark-up (20% of the c.i.f. value of imported machinery) was not much less arbitrary. It was based on fragmentary information concerning investment in Egyptian industry as well as studies of other countries at similar stages of development. According to a study of investment in Egypt in 1955, transport costs, insurance commission, trade margin and installation costs were put at 18% of the c.i.f. value of imported machines and equipment[48]. Moreover, in the Ministry of Industry's investment programme for 1969/70, expenses of transport amounted to 10% - 12% and fitting and installation costs to 9% - 11% of the c.i.f. value of imported machinery[49]. Finally, a study of GDFCF in India for the period 1948/9 - 1954/5, assumed a 20% mark-up to account for trade and transport charges[50]. Despite these indi-

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47. Ramamurti and Pedderson, op. cit., p.110.

48. N. Dief, Investment in Fixed Assets during the year 1955: a Preliminary Estimate, Ministry of Finance, Economics Department, Cairo, December 1956. According to Dr. Dief, CF in Egypt in 1955 amounted to L.E. 126.3m. of which L.E. 47.4m. were in machinery and transport equipment (p.16). If we know that imports of this category were L.E. 40m. in that year, transport and installation costs would be L.E. 7.4m. i.e. 18% of the c.i.f. value of imports. Ibid., pp.2 and 9-11 and Appendix II.

49. Ministry of Industry, A Statement of Investment Allocated to Industrial Projects for the Financial Year 1969-70, Cairo, May 1969.

50. B. Kumar, "Estimates of Domestic Fixed Capital Formation in India, 1948-49 to 1954-55" in V.K.R.V. RAO et. al. (ed.) Papers on National Income and Allied Topics, Vol.I Asia Publishing House, London, 1960, p.130.

cations that a 20% mark-up is likely to be the correct order of magnitude, it remains subject to criticism on the grounds of (a) its arbitrariness and, (b) the implicit assumption that distributive and installation costs as a ratio of the c.i.f. value of imports remained constant over 85 years.

The next problem in estimating GFCF in industry was to estimate investment in building and construction. In almost all the studies of capital formation in developing countries, a certain estimate of investment in factory buildings is added to the derived value of machinery and equipment of obtain total GFCF[51]. This estimate is in many cases based on data relating to building permits; investment during the year is equal to the value of buildings for which permits were issued during that year. This method raises a number of problems; first, while in some countries permits cover all important areas, in others they only refer to the major metropolitan areas, in which case data should be adjusted in such a way as to reflect building activities throughout the country. Secondly, values declared in permits may be unrealistic in view of the time-lag between issuing the permit and actual building, and since some buildings for which permits have been issued may not be completed, nor even started. An alternative method is to estimate the retail value of construction materials (cement, steel, bricks, etc.) used during the accounting period, plus an allowance for labour costs[52]. This method suffers

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51. R.W. Holley, op. cit., p.201, and Rammamurti and Peddersen, op. cit., pp.111-113.

52. For examples of such estimates see; H. Rosovsky, Capital Formation in Japan, 1868-1940, Noew York, 1961, pp.271-83; B. Kumar, Estimates of DFCF in India, op. cit., pp.122-27; and T. Khan, Capital Formation in Pakistan, Memo.221, Institute of National Planning, Cairo, August, 1962.

from a number of weaknesses due to lack of data on the domestic production of construction materials, regardless of the fact that the materials cost-component may vary considerably for various types of construction, and the arbitrary estimation of labour costs.

In Egypt's case, the inadequacy of data made it difficult to adopt any of those methods. Earlier estimates of building and construction, for instance, were limited to measuring the aggragate capital value of town buildings on the basis of taxes levied on urban property[53]. But not all buildings are subject to taxes; buildings owned by government, non-profit-making organisations and educational bodies are usually exempted from tax, and tax covers only urban areas. More important, tax returns, and estimates based on them, are too aggregated to allow any classification of buildings according to their use i.e., residential, factories, offices... etc., and are therefore of no use for our purpose, of measuring CF in factory buildings. Furthermore, I found it extremely difficult to obtain data on material and labour inputs in buildings, let alone industrial buildings.

In view of these data limitations, I attempted to estimate investment in industrial buildings and construction, according to the commodity-flow approach, by applying a certain

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53. A. Eid, La Fortune Immobilière de l'Egypte et sa Dette Hypothecaire, Paris, 1907, pp.39-82,
Comte Gressaty, L'Egypte d'aujourd'hui, Paris, 1912,
E. Minost, "Essai Sur La Propriété Batie de l'Egypte", L'Egypte Contemporaine, No.130, November 1931,
M.M. Hamdi, op. cit., pp.131-181, and
Federation of Egyptian Industries, Yearbook, 1954/55, p.136 (Arabic edn.). Capital value for buildings, in these studies, were calculated on the assumption that the building tax represented 10% of the rental value, and this ranged between 8.3% and 10% of the capital value of buildings.

mark-up to the value (at current prices) of machinery. To allow for the possibility of a change in the mark-up over time, the period of study was divided into five sub-periods, during each of which the mark-up was based on the estimated share of buildings in new investment in industrial companies. These shares were as follows: (percentages)

Period	Machinery	Buildings
i) before 1899	35	65
ii) 1899-1925	40	60
iii) 1926-1945	50	50
iv) 1946-1956	53	47
v) 1957-1967	67	33

Estimates for the first three periods were very difficult to make. No satisfactory data on the composition of investment by type of capital goods were available before the mid-1930's. In fact, it was not until the publication of the 1941 "Statistique des Sociétés Anonymes", containing the detailed accounts of all the joint stock companies operating in Egypt for the period 1934-38, that somewhat reliable data became available[54]. These company accounts provided the basis of my estimate of the share of buildings and machinery in total investment during that period. Different companies founded between 1934-38 were grouped, according to activity, into 12 sub-sectors: Cotton Ginning and Pressing, Building Materials, Sugar, Beverages, Cigarettes, Textile, Paper, Printing, Leather, Rubber, Chemicals, and Engineering. Total "expenditure" on fixed assets as shown in the initial balance sheet of each

54. Department of Statistics and Census, Statistique des Sociétés Anonymes par Action Travaillant Principalement en Egypte, 1941, Cairo, 1943.

company (which gives only rough approximations to GFCF during the 1930's because of the depreciation problem[55]) were divided between: (a) machinery and equipment, and (b) building and construction. The share of each of these assets in the various industry groups was the weighted average of its share in each company of the group during the years 1934-38.

For earlier years, where such data were not available, I used the 1930's shares for different industries throughout[56]. Shares of machinery and buildings for total industry were estimated for each decade since 1890, as the weighted average of the 1934-38 ratios; using as weights the share in industrial "investment" (i.e. capital investment by new companies and new investment by established ones) of the 12 industry groups in each decade. Here again, the actual shares of these industry groups in investment are not really known, but they were assumed to be similar to their share in the changes in capital as shown by the companies' balance sheets.

Before 1890, where the distribution of capital by industry was not available, I assumed a 65% share of buildings which represents a simple average of the share of buildings in sugar (60%) and Cotton Ginning (70%), the two industries which dominated the industrial structure at that time (together representing 65.6% of total paid-up capital of industrial companies in 1899)[57].

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55. Surely the "expenditure" must have already been depreciated by the time it appears in the company accounts. But this is the nearest to a flow concept we could obtain from available data.

56. However, we can guess from the relative price indices that the share of buildings would have tended to be higher. Compare the price index of machinery (Table 3-1) with that of buildings (Table 3-2).

57. See Table 5-6 below.

While our method accounts for an important source of change in the machinery/building ratio, namely; the effect of structural change in industry, it assumes that the ratio within each industry was the same in the 1890's as in the 1930's. Obviously this is an unsatisfactory assumption, but in the absence of information alternative assumptions were difficult to make. Our method suggests that the fall in the share of buildings in GFCF was due to the change in industrial structure towards more machinery-intensive industries. It is not possible, however, to say in which direction this share within each industry would have changed. Share at constant prices is a function of many factors: principally change in technology, and it may either have risen or fallen. But changes in the relative prices of machinery and buildings were such as to impart an upward trend to the share of machinery (the average annual rate of change in the price index of industrial machinery amounted to 2.69% while that of buildings amounted only to 0.24% during the period 1899-1938[58]. Moreover, the above ratios are more likely to reflect the changing structure of the companies in the corporate sector as, our calculations were based on the accounts of these companies, with the small-scale firms entirely left out. Despite these limitations, our estimate of the ratio of machinery in GFCF for period (iii) which amounted to 50%, compares very well with the 53% used for period (iv) and which was estimated by the National Planning Committee.

Improved data were available for the last two periods.

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58. Tables 3-1 and 3-2.

Figures for period (iv) are those used by the National Planning Committee in preparing their estimates of gross investment in industry for the period 1942/3 - 1959/60[59]. They imply a constant 53% share of imported machinery. In period (v), the share of buildings in industrial capital formation was based on data published by the Ministry of Planning on the structure of investment during the Five-Year Plan, 1959/60 - 1964/65[60].

Finally, these ratios were used to estimate the value of industrial buildings (at current prices) as a mark-up of the value of imported machinery (also as current prices). To avoid abrupt change, however, I assumed a smooth change of these ratios over time, with two exceptions; (a) during World War II the share of machinery was held constant and at a level slightly lower than the pre-war ratio (54%) to allow for the fact that imports of machinery were drastically reduced during the War[61], and (b) a sudden rise in the share of machinery was also allowed in 1957 (to 64% from 60% in 1956) and 1960 (to 67% from 66% in 1959), to correspond with the abrupt changes in the pattern of industrial investment under the two industrialization programmes which began in those years[62].

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59. National Planning Committee, mimeographed tables. This estimate was derived by applying an 87.3% mark-up to the c.i.f. value of imported machinery.

60. Ministry of Planning, Central Follow-up Department, Gross Fixed Capital Formation by Type of Capital Goods -- Current Prices, 1964/65, unpublished data based on the actual implementation of the Five-Year Plan (1959/60-1964/65).

61. The level of 50% assumed for World War II is equal to the average of period (iii).

62. See section 5.2.5 of chapter 5 below.

An important implication of these estimates, and one that needs to be explained, is the significant and surprising change from a ratio of machinery to buildings of about 1:2 at the beginning of the period to 2:1 at the end. However, evidence suggests that in the case of Egypt such a complete reversal of the machinery/buildings ratio over a period of 85 years may not be as unrealistic as may at first appear. The historical experience of developed countries suggests that a similar, though less pronounced, shift in the composition of capital formation has taken place. Kuznet's study of the long term trends in capital formation proportions shows that the general trend in developed countries has been for the share of "producers equipment" in GDCF (at current prices) to rise and that of non-residential construction to fall over the period between the 1850's and the 1940's[63]. For example, the share of construction in GFCF (at current prices) has declined by 20% (from 69.8% in 1869-88 to 56.0% in 1946-55) in the case of U.S.A.; by 24% (from 71.1% in 1864-1882 to 54% in 1938-48) for Sweden; by 34% (from 63.0% in 1870-89 to 41.4% in 1948-52) for Denmark; and by 41% (from 43.2% in 1861-80 to 25.6% in 1921-40) for Italy[64].

Moreover, a cross-section study of the structure of capital formation in 17 countries representing varying levels of per-capita incomes, suggested that the share of construction in GFCF shifts from 55% in highly developed countries

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63. S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations: VI Long-Term Trends in Capital Formation Proportions", Economic Development and Cultural Change, Vol.9, No.4, July, 1961, Table 13, pp.38-9..

64. Ibid., Table 14, p.41.

(U.S.A., U.K., Germany, Norway) to 57% in countries at intermediate levels of development (Japan, Greece, Turkey, South Africa) and as high as 61% in less developed countries (Egypt, Ceylon, Peru, Nigeria)[65]. The share of producers' equipment varies correspondingly from 45% - 39%, and if allowance is made for differential price levels, which would be much higher for equipment than for construction in the less developed countries, the share of construction might become significantly larger for less developed than for developed countries, and that of equipment correspondingly lower[66]. In view of these findings, one would expect a significant rise in the share of machinery as industrialization proceeds. Nevertheless, the shift in the share of machinery from 35% of GFCF before 1899 to 67% in 1967 in the case of Egypt might still appear considerable. Here we can make a comparison with the case of Japan between 1887 and 1940, during which time it might have reached a stage of development roughly comparable to Egypt in the 1960's. Rosovky's study of CF in Japan shows that the change in the share of "Producers' Durable Equipment" in GDFCF was as follows[67]:

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65. S. Kuznets, "Quantitative Aspects of the Economic Growth of Nations: V Capital Formation Proportions: International Comparisons for Recent Years", Economic Development and Cultural Change, Vol.8, No.4, July 1960, Table 6, p.33.

66. Ibid., p.34.

67. H. Rosovsky, Capital Formation in Japan, 1868-1940, New York, 1961, Table I, pp.2-3. Rosovsky's figures refer to the share of Producers' durable equipment in the whole economy and therefore can only be regarded as a rough pointer to the shift in this share in the manufacturing sector. However, Ohkawa's study of Capital Stock in Japan shows that a similar and even more pronounced shift took place in the "Non-Primary Sector" where the share of machinery in total GDFCS increased from 9.7% in 1890 to 19% in 1900, 45.8% in 1920 and 47.7% in 1940. See, K. Ohkawa et. al., Estimates of Long-Term Economic Statistics of Japan since 1868: 3. Capital Stock, Tokyo, 1969, Table 5, p.160.

Period	Share of Durable Equipment in GDFCF %
1887-96	32.2
1892-1901	24.6
1897-1906	40.3
1902-11	47.4
1912-21	52.0
1917-26	44.5
1922-31	38.3
1927-36	50.4
1931-40	70.3

The question now is how to account for the notable change in the composition of capital formation in Egyptian industry. This change can largely be explained in terms of three developments that took place during the period of study. First, structural change; Egypt's small manufacturing sector which at the turn of the century was dominated by simple processing industries (the principal activities of the 23 joint-stock companies which represented the modern sector of industry in 1899 were: cotton ginning, sugar processing, beverages, cigarettes and building materials[68]) was transformed through successive phases of development into a much more complex and diversified one. The 1920's and 1930's witnessed the beginning of an industrialization wave which at first centred around cotton textiles, but was soon to develop, especially after World War II, into a wider attempt to replace imports of most consumer and some intermediate goods by domestic products. By 1967, the modern sector of industry (5262 establishments employing 10 and more workers) extended to cover, besides the traditional processing industries, such a wide range of new activities as wood, paper, chemicals, pharmaceuticals, fertilizers, petroleum refining, consumer durables, iron and steel and transport equipment[69]. An important feature of this

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68. See Table 5-6 below.

69. C.A.P.M.S. Census of Industrial Production, 1966-67, Table III.

structural change is that it was brought about by introducing industries which, by nature, tend to be machinery-intensive[70]. In order to assess the effect of this structural change on the composition of capital formation, I calculated the share of machinery in GFCF which would have obtained in 1960-65 had the machinery/buildings ratios of 1934-38 remained unchanged, i.e., assuming that factors other than structural change (technology and relative prices) remained constant. The share of machinery thus calculated (a weighted average of the share of machinery in different industry groups in 1934-38; weights being the share of these industries in GFCF in the Five-Year Plan, 1960-65[71]), amounted to 58% of GFCF in 1960-65. In other words, the change in the industrial structure between the 1930's and 1960's explains alone eight of the 17 percentage points increase in the share of machinery during this period.

Secondly, a parallel development to the change in the industrial structure was the continuous improvement in technology[72]. Unfortunately, we have nothing for Egypt in the way of a history of technology, but the accounts of foreign travellers, historians and government commissions provide suggestive material. For example Eman's description of the production techniques in

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70. The share of machinery and equipment in total investment allocated for the First Five-Year Plan (1960-65), amounted to 71% for "Metallic Products", 72% for "Machinery and Transport Equipment", 85% for "Chemicals" and as high as 95% in the case of "Petroleum", see National Planning Committee, General Frame of the Five Year Plan, Cairo, 1960, Table 8, p.34.

71. Investment figures from the Ministry of Planning, Appraisal of the First Five Year Plan, i.e. the 2nd Industrial Programme (1960/61-1964/65 in the Industrial Sector, Cairo, 1966.

72. It should be pointed out here that factors other than structural change that explain the shift in the machinery/buildings ratio, change in technology and relative prices, apply only to the period after the 1930's as they were assumed constant when we calculated the ratios for the period between the 1890's and 1930's.

the cotton industry[73], Mazuel's account of the sugar industry[74], and what the "Commission du Commerce et de l'Industrie" reported about many other industries[75], all of which relate to the late 19th and early 20th centuries, bear little resemblance to present-day techniques. Newer technology does not necessarily mean more machinery per building, but there are some rough indications that this may have been the case. It is interesting to mention that many of the large industrial companies (such as the Société Misr pour la Filature et le Tissage du Coton, Egyptian Salt and Soda Co., Eastern Company for Cigarettes, and Cement Portland Tourah) have always occupied the same building which was modified only to accomodate new machinery. Moreover, evidence suggests that at least since World War II, investment policies have on the whole favoured more machinery-intensive techniques[76]. The Misr group took pride in that their newly-established companies (1920's and 1930's) employed "the latest products of European technology"[77]. The post-war Industrial expansion was mainly based on importing "the most modern machinery from Europe"[78]. Even planners in the 1960's (mostly engineers) identified progress with highly mechanized techniques of production[79]. An

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73. A. Eman, L'Industrie du Coton en Egypte: Etude d'Economie Politique, Cairo, 1943.
74. J. Mazuel, Le Sucre en Egypte: Etude de Géographie, Historique et Economique, Cairo, 1937.
75. Gouvernement Egyptien, Rapport de la Commission du Commerce et de l'Industrie, Cairo, 1918.
76. B. Hansen and E.A. Marzouk, Development and Economic Policy in the U.A.R. (Egypt), Amsterdam, 1965, pp.130-2.
77. Bank Misr, The Golden Jubilee: 1920-1970, Cairo, 1970, pp.186 and 190.
78. Charles Issawi , Egypt at Mid-Century, London, 1954, pp.141-3.
79. National Planning Committee, General Frame of the Five Year Plan, op. cit., p.9.

indication of the effects of these developments is provided by the index of capital intensity (measured in terms of the horse-power equivalent of industrial machinery per worker) which has risen from 100 in 1937 to 127 in 1954 and 174 in 1960, despite a remarkable increase in employment from 100 to 161 and 202 during the same period[80].

Finally, the notable rise in the machinery/buildings ratio can also be explained by differences in the change of the relative costs of both assets. A comparison of the price index of industrial machinery to that of buildings (used in the deflator) shows that the average annual rate of change in the former (5.96%) was relatively higher than the latter (5.36%) during the period 1940-1967[81]. This suggests that the cost of machinery must have been increasing faster than the cost of buildings which partly explains the higher share of machinery in industrial investment.

3.3.2 Price Adjustments

The measure of GFCF in industrial machinery and buildings so far discussed was expressed in money terms at the prices ruling during the period when investment took place, i.e. at current prices. To convert these series to constant prices, I used the following price indices:[82]

I. Machinery Price Indices: the deflator for industrial machinery was based on the following indices:

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80. Calculations based on figures from D. Mead, Growth and Structural Change in the Egyptian Economy, Illinois, 1967, Table 5.5, p.112.

81. The price index of machinery from Table 2.1 and that of buildings from Table 2.2.

82. For the basic series of these indices see Appendix Table A-1.

i. 1882-1959: U.K. price index of machinery exports:

a. 1882-1920: the average price index of U.K. exports of "Machinery" obtained by dividing values of such exports in each year by the corresponding volume index[83].

b. 1920-1938: An average of H.J.D. Cole's price indices of U.K. exports of the various groups of industrial machinery[84], weighted by the shares of these groups in Egypt's imports of industrial machinery, average 1927-29[85].

c. 1938-1959: U.K. price index of exports of "Machinery and Transport Equipment", previously reported as "Metal Goods and Engineering Products"[86].

The choice of the U.K. export price index as a deflator is justified on the grounds that during this period, Britain was by far the largest supplier of machinery to Egypt.

ii. 1959-1967: From the early 1950's, Britain was replaced by the U.S.S.R., Eastern Europe and West Germany, as the principal exporters of machinery to Egypt. Consequently, the U.K. export price index became less representative of changes in the prices of imported machinery. Instead, I used as a deflator for this period, the price index of Egypt's imports of "Machinery, Electric Apparatus, and their Parts", which is a

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83. This index was obtained by dividing annual figures on the value at current prices of U.K. exports of "Machinery" (B.R. Mitchell and P. Deane, Abstract of British Historical Statistics, Cambridge, 1962, Table 8, pp.304-5) by the corresponding volume index, 1913=100 (Werner Schlote, British Overseas Trade From 1700 to the 1930's, Oxford, 1952, Table 16, pp. 153-4).
84. H.J.D. Cole, "Machinery Prices Between the Wars", Bulletin of The Oxford University Institute of Statistics, Vol.13, No.3, March, 1951, Table I, p.84.
85. Appendix Table A-13, part 2.
86. U.K., Central Statistical Office, Annual Abstract of Statistics, various issues.

weighted average of the prices of capital goods imported from various exporting countries[87].

II. Buildings Price Indices: The current price series of GFCF in industrial buildings was expressed in terms of constant prices by using as a deflator a weighted average of the following three indices:

i. An industrial money-wage index to account for the contribution of domestic labour engaged in the construction of industrial buildings and works. In the absence of an industrial wage index before 1937, I used the wholesale price index in Egypt which covers 23 commodities mainly consumer goods[88]. For 1937-67, I used the industrial money-wage index based on the average weekly rate of industrial wages in Egypt[89].

ii. A price index of building materials, to account for changes in the cost of this input. For the period 1882-1936, where no domestic price index was available, I used the unit value index of U.K. exports of cement[90]. The use of a U.K. export price can be justified on the grounds that, although Egypt started producing cement on a very limited scale in the 1890's, it was not until the late 1930's that production on a large scale really began. Meanwhile, most of Egypt's needs for cement were supplied by imports, particularly from Britain. For the

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87. C.A.P.M.S., The Development of Foreign Trade During the Five-Year Plan 1960-65 and for the Years 1965/66 and 66/67, Ref. No.20-006, Cairo, May, 1968, p.75. As this index was not available before 1959, I continued to use the U.K. export price index.
88. For the period 1899-1929; M. El-Darwish, A New Series of Index Numbers of Wholesale Prices in Egypt, 1899-1929, Ministry of Finance, Technical Bulletin, No.2, Cairo 1931, and for the period 1930-1936, Annuaire Statistique, various issues. Using this index as a proxy for a wage index implies the assumptions that, during this period, wages earned by workers were entirely spent on wage-goods, and that the ratio of wages to prices remained constant.
89. 1937-41: M.A. Anis, A Study of the National Income of Egypt, op. cit., p.805; 1942-62: R. Mabro, Industrial Growth, Agricultural Unemployment and the Lewis Model, op. cit., p.335; 1963-67: I.L.O. Yearbook of Labour Statistics, 1969, Geneva, 1970, p.536.
90. U.K. Central Statistical Office, Statistical Abstract of the U.K., various issues.

rest of the period, 1937-67, I used Egypt's wholesale price index of "Building Materials" which is based mainly on the prices of cement and bricks[91].

iii. A price index of metals used in building and construction. As in the case of building materials, and for similar reasons, the unit value index of U.K. exports of iron and steel was used for the period 1882-1936[92]. As for 1937-67, Egypt's wholesale price index of "Metals" was used[93]. This index is based on the market prices of imported metals and, since the late 1950's, of metals domestically produced.

The weights given to the above indices were based on the respective share of the three inputs in investment in industrial buildings. To allow for the possibility of change in these shares over time, the period of study was divided into two sub-periods: (a) 1882-1956: where weights were based on the estimate of the relative shares of wages (26%), building materials (53%) and metals (21%) used by the National Planning Committee in preparing their investment series for the period 1942-59[94], and (b) 1956-67: where weights were based on a similar estimate of the share of these three inputs in investment under the Five-Year Plan (1959/60-1964/65) which amounted to 30%, 40% and 27% for wages, building materials and metals respectively[95].

Compared to deflators used in CF estimates for many less developed countries, ours represent a definite improvement: the

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91. National Bank of Egypt, Economic Bulletin, various issues.
92. For 1882-1920, the index was obtained by dividing annual values of U.K. exports of "Iron and Steel" (Mitchell and Deane, op. cit., Table 8, pp.304-6) by their volume (Schlote, op. cit. Table 16, pp.153-4). For 1920-26, the same procedure was applied to data from the Statistical Abstract of the U.K., various issues. As for 1926-37, we used the average price index of U.K. exports of "Iron & Steel and Manufactures" published by the Board of Trade Journal, various issues.
93. National Bank of Egypt, Economic Bulletin, various issues.
94. National Planning Committee, mimeographed tables.
95. Ministry of Planning, Gross Fixed Capital Formation by Type of Capital Goods - Current Prices, unpublished data based on the actual implementation of the 5-Year Plan, (1959/60-1964/65.

combination of the different price indices likely to affect the price of capital goods (prices in exporting countries and domestic prices), and the choice of a separate deflator for machinery and buildings. Nevertheless, the present approach of using a weighted average of cost indices as a deflator would not account for quality changes except in as much as these changes were reflected in the prices of capital goods. Moreover, the assumption that weights for the buildings price indices were constant over the period 1882-1956 may be rather arbitrary. But the lack of detailed data on the cost structure of investment in the early period made a more realistic assessment of weights impossible.

3.3.3 Depreciation

The third step in this estimate was to calculate NFCF. This was obtained by deducting from GFCF (at constant prices) for any given year, estimates of capital depreciation during that year. Depreciation was accounted for by using the straight-line method, and assuming an annual rate of depreciation of 6.25% for machinery and 2% for buildings which imply an average length of life of these assets of 16 and 50 years respectively. The choice of these depreciation rates was based on national accounting practices in Egypt. Depreciation rates declared by industrial companies as well as those reported by the "Industrial Census" were both rejected here on the grounds that the former were usually exaggerated to enable companies to retain a higher share of their profits, and the latter are in most cases "arm-chair guesses". The rates used in the present study were based on the recommendations of the "Standardized Accounting System of the U.A.R." (SAS), which has been in operation since July 1967[96]. By the beginning of 1970, it has been adopted by 436

96. U.A.R. Central Auditing Organization, A Note on the Standardised Accounting System in the U.A.R., Cairo, 1967.

establishments of which 190 were engaged in mining, manufacturing and electricity[97]. SAS provides a detailed list of depreciation rates recommended for each asset in different uses and different branches of industry. These rates were the outcome of technical and economic studies of the actual length of life of different assets in Egypt's experience[98]. The rates of depreciation for machinery and buildings used in the present study are the weighted averages of those recommended by SAS for the thirteen branches of Egyptian manufacturing industry, using as weights the share of these industries in investment over the period 1960-65.

The present method of accounting for depreciation represents an improvement on previous estimates of CF in Egyptian industry (section 3.2.3 above), where a unified rate of depreciation of 4%, 5%, or 7% was applied, without discrimination between machinery and buildings, and with no obvious justification for the choice of such rates. Moreover, our rates of depreciation (6.25% for machinery and 2% for buildings) appear very plausible when compared with those of other countries at similar stages of development. Comparable rates of depreciation for both India and Argentina, for example are 5% and 2% for machinery and buildings, respectively[99]. However, our assump-

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97. Ibid., p.10.

98. Ibid., pp.61-2. The detailed list of depreciation rates is published in Annex I to the SAS, where it is also specified that depreciation for all fixed assets should be accounted for according to the straight-line method, assuming zero scrap value at the end of the asset's life.

99. On India see; B. Kumar, Estimates of Domestic Fixed Capital Formation in India, 1948/49-1954/55, op. cit., pp.126 and 130-31, and for Argintina; M. Balboa and A. Fraccia, "Fixed Reproducible Capital in Argentina, 1935-1955", in R. Goldsmith and C. Saunders (eds.) The Measurement of National Wealth, Income and Wealth, Series VIII, London 1959, p.282.

tion of a constant depreciation rate over the whole period of study does not allow for periods of exceptionally rapid depreciation such as wars, when difficulty to import capital goods led to an intensive use of the existing stock. But information on this point is too insufficient to warrant the adoption of different lives for the same type of asset in different periods.

3.3.4 Gross and Net Fixed Capital Stock

Estimates of gross and net fixed capital stock were measured, for machinery and buildings separately, according to the perpetual inventory method outlined in Chapter I, section 1.4. GFCS was measured by cumulating GFCF, and deducting cumulated retirements, all at constant prices, and NFCS by cumulating GFCF less cumulated depreciation, that is, by cumulating NFCF, again all at constant prices. Under the constant length of life and zero scrap value assumptions, an asset is kept in the gross stock at its full value until it is suddenly discarded at the end of its estimated life (16 years in the case of machinery and 50 for buildings). By contrast, in the case of the net stock an asset is depreciated throughout its lifetime, i.e. it is gradually removed from the stock.

To estimate series of gross and net capital stock it is therefore necessary to have series of GFCF, depreciation and scrapping, and estimates of the initial capital stocks. The GFCF and depreciation series were discussed in earlier sections. Scrapping was estimated on the assumption that assets were entirely scrapped at the end of their assumed lives. The estimates of the initial stocks require further explanation.

Following Goldsmith's perpetual inventory method[100], the first cost and depreciated values of the initial stock (in 1899) were obtained for machinery and buildings separately by cumu-

100. R.W. Goldsmith, The National Wealth of the United States in the Post-War period, N.B.E.R., Princeton, 1962, pp.10-13.

lating capital expenditure on each of the two assets over a number of years equal to their assumed lengths of life. Initial gross stock (at constant prices) was estimated by cumulating gross investment, and net stock by cumulating net investment (i.e. GFCF - Depreciation). The application of this method required, therefore, estimates of GFCF, scrapping, depreciation and hence NFCF back to the first year in which assets still in the initial (1899) stock were acquired; i.e. 16 years earlier in the case of machinery and 50 years in the case of buildings. Only in the case of machinery was this possible as our investment series extended as far back as 1882. According to this estimate GFCS and NFCS in industrial machinery (at constant 1960 prices) amounted to £E.57.5m. and £E.31.0m. respectively at the end of 1899. As for industrial buildings, requiring series of investment 50 years previous to our starting point (1889), the problem was to construct an investment series as far back as 1850. For the period 1882-1899, I used the GFCF series estimated above (as a mark-up on imported machinery). As for the previous 32 years where no reliable indicator of investment in industrial buildings was available, I assumed a constant amount of gross annual investment of £E.1m. (at 1960 prices). This is no more than an informed guess in the light of the level of gross investment for the years 1882-86 when figures were available (£E.1.8m. on average), and the slow pace of industrialization which characterized the development of the Egyptian economy during the second half of the 19th Century. The resulting series of GFCF was used to estimate initial GFCS in buildings which amounted to £E.89.4m. at the end of 1899 and NFCS (= cumulated GFCS less cumulated depreciation) which amounted to £E.58.0m. both at 1960 prices.

Estimates of Gross and Net FCF and FCS in Egyptian indus-

Table 3-1

Capital Formation and Capital Stock in Industrial Machinery, 1899-1967

£.E.million

Year	GFCF at Current Prices (1)	Price Deflator 1960=100 (2)	GFCF at Constant 1960 Prices (3)	GFCS at End of Year 1960 Prices (4)	Depreciation (5% per year) (5)	NFCF (6)	NFCS (7)
1899				57.5	3.6		31.0
1900	0.560	9.0	6.2	61.8	3.9	2.3	33.3
1	0.604	8.7	6.9	66.8	4.2	2.7	36.0
2	0.512	8.8	5.8	70.8	4.4	1.4	37.4
3	0.582	9.4	6.2	69.6	4.4	1.8	39.2
4	0.937	9.6	9.8	75.6	4.7	5.1	44.3
5	0.701	9.2	7.6	81.8	5.1	2.5	46.8
6	0.850	9.2	9.2	88.8	5.6	3.6	50.4
7	0.766	9.4	8.1	94.9	5.9	2.2	52.6
8	0.512	9.6	5.3	96.6	6.0	-0.7	51.9
9	0.396	9.9	4.0	98.5	6.2	-2.2	49.7
1910	0.442	9.9	4.5	98.9	6.2	-1.7	48.0
11	0.655	10.1	6.5	100.7	6.3	0.2	48.2
12	0.683	10.3	6.6	100.9	6.3	0.3	48.5
13	0.775	10.7	7.2	104.7	6.5	0.7	49.2
14	0.583	11.9	4.9	105.5	6.6	-1.7	47.5
15	0.191	14.1	1.4	100.2	6.3	-4.9	42.6
16	0.242	14.4	1.7	95.7	6.0	-4.3	38.3
17	0.227	17.2	1.3	90.1	5.6	-4.3	34.0
18	0.354	20.7	1.7	86.0	5.4	-3.7	30.3
19	0.745	24.0	3.1	82.9	5.2	-2.1	28.2
1920	2.185	28.3	7.7	80.8	5.1	2.6	30.8
21	2.395	31.5	7.6	80.8	5.1	2.5	33.3
22	0.086	27.8	2.9	74.5	4.7	-1.8	31.5
23	1.390	21.0	6.6	73.0	4.6	2.0	33.5
24	1.603	20.1	8.0	75.7	4.7	3.3	36.8
25	2.201	19.7	11.2	82.8	5.2	6.0	42.8
26	1.690	19.8	8.5	86.9	5.4	3.1	45.9
27	1.570	19.2	8.2	88.6	5.5	2.7	48.6
28	1.783	19.3	9.2	91.2	5.7	3.5	52.1
29	2.250	19.3	11.7	95.7	6.0	5.7	57.8
1930	2.983	19.5	15.3	106.1	6.6	8.7	66.5
31	2.101	20.1	10.5	115.2	7.2	3.3	69.8
32	1.798	19.7	9.1	122.6	7.7	1.4	71.2
33	1.489	20.1	7.4	128.7	8.0	-0.6	70.6
34	1.740	20.1	8.7	135.7	8.5	0.2	70.8
35	1.998	19.9	10.0	142.6	8.9	1.1	71.9
36	1.868	20.7	9.0	143.9	9.0	0.0	71.9
37	2.472	22.4	11.0	147.3	9.2	1.8	73.7
38	2.478	25.4	9.8	154.2	9.6	0.2	73.9
39	2.570	25.9	9.9	157.5	9.8	0.1	74.0
1940	1.432	31.2	4.6	154.1	9.6	-5.0	69.0
41	1.124	34.8	3.2	146.1	9.1	-5.9	63.1
42	1.280	39.8	3.2	140.8	8.8	-5.6	57.5
43	1.115	43.1	2.6	135.2	8.5	-5.9	51.6
44	1.520	43.4	3.5	129.5	8.1	-4.6	47.0
45	2.454	43.1	5.7	123.5	7.7	-2.0	45.0
46	6.708	49.0	13.7	121.9	7.6	6.1	51.1
47	10.523	56.3	18.7	130.1	8.1	10.6	61.7
1948	16.717	60.9	27.5	148.5	9.3	18.2	79.9
49	19.879	62.9	31.6	172.7	10.8	20.8	100.7
1950	19.824	65.5	30.3	194.3	12.1	18.2	118.9
51	22.380	74.0	30.2	214.5	13.4	16.8	135.7
52	23.725	82.5	28.8	234.3	14.6	14.2	149.9
53	17.736	83.2	21.3	244.6	15.3	6.0	155.9
54	21.119	83.8	25.2	260.0	16.3	8.9	164.8
55	33.762	85.9	39.3	289.4	18.1	21.2	186.0
56	33.744	88.9	38.0	322.8	20.2	17.8	203.8
57	19.920	92.9	21.4	341.0	21.3	0.1	204.9
58	35.172	96.0	36.6	374.4	23.4	13.2	217.1
59	37.842	98.0	38.6	410.4	25.7	12.9	230.0
1960	34.146	100.0	34.1	441.0	27.6	6.5	236.5
61	30.972	125.0	24.8	460.1	28.8	-4.0	232.5
62	46.240	114.0	40.6	487.0	30.4	10.2	242.7
63	60.916	120.0	50.8	519.1	32.4	18.4	261.1
64	51.548	141.0	36.6	528.2	33.0	3.6	264.7
65	62.713	165.0	38.0	534.6	33.4	4.6	269.3
66	61.560	127.0	48.5	552.8	34.6	13.9	283.2
67	38.640	149.0	25.9	548.5	34.3	8.4	291.6

Table 3-2

Capital Formation and Capital Stock in Industrial Buildings, 1899-1967

£.E.million

Year	GFCF at Current Prices (1)	Price Deflator 1960=100 (2)	GFCF at Constant 1960 Prices (3)	GFCS at End of Year 1960 Prices (4)	Depreciation (5% per year) (5)	NFCF (6)	NFCS (7)
1899				89.4	1.8		58.0
1900	0.840	17.9	4.7	93.1	1.9	2.8	60.8
1	0.906	17.2	5.3	97.4	1.9	3.4	64.2
2	0.768	16.0	4.8	101.2	2.0	2.8	67.0
3	0.873	16.0	5.5	105.7	2.1	3.4	70.4
4	1.406	15.5	9.1	113.8	2.3	6.8	77.2
5	1.052	15.4	6.8	119.6	2.4	4.4	81.6
6	1.275	15.7	8.1	126.7	2.5	5.6	87.2
7	1.149	17.1	6.7	132.4	2.6	4.1	91.3
8	0.768	16.5	4.7	136.1	2.7	2.0	93.3
9	0.594	15.7	3.8	138.9	2.8	1.0	94.3
1910	0.663	15.6	4.3	142.2	2.8	1.5	95.8
11	0.983	16.0	6.1	147.3	2.9	3.2	99.0
12	1.025	16.9	6.1	152.4	3.0	3.1	102.1
13	1.163	18.3	6.4	157.8	3.2	3.2	105.3
14	0.875	18.1	4.8	161.6	3.2	1.6	106.9
15	0.287	21.6	1.3	161.9	3.2	-1.9	105.0
16	0.363	27.9	1.3	162.2	3.2	-1.9	103.1
17	0.341	34.9	1.0	162.2	3.2	-2.2	100.9
18	0.531	40.1	1.3	162.5	3.3	-2.0	98.9
19	1.118	50.8	2.2	163.7	3.3	-1.1	97.8
1920	3.278	59.9	5.5	168.2	3.4	2.1	99.9
21	3.593	56.6	6.3	173.5	3.5	2.8	102.7
22	1.209	35.0	3.5	176.0	3.5	0.0	102.7
23	2.085	31.3	6.7	181.7	3.6	3.1	105.8
24	2.405	30.1	8.0	188.7	3.8	4.2	110.0
25	3.302	29.5	11.2	198.9	4.0	7.2	117.2
26	2.280	29.4	7.8	205.7	4.1	3.7	120.9
27	2.170	28.7	7.6	212.3	4.2	3.4	124.3
28	2.364	26.7	8.9	220.2	4.4	4.5	128.8
29	2.864	23.6	12.1	231.3	4.6	7.5	136.3
1930	3.645	22.8	16.0	246.3	4.9	11.1	147.4
31	3.275	21.2	15.4	260.7	5.2	10.2	157.6
32	2.028	19.5	10.4	269.3	5.4	5.0	162.6
33	1.613	18.2	8.9	276.6	5.5	3.4	166.0
34	1.811	16.1	11.2	285.9	5.7	5.5	171.5
35	1.998	16.5	12.1	296.1	5.9	6.2	177.7
36	1.795	17.2	10.4	304.8	6.1	4.3	182.0
37	2.282	19.1	11.9	310.0	6.2	5.7	187.7
38	2.198	19.7	11.2	317.7	6.4	4.8	192.5
39	2.190	19.1	11.5	327.8	6.6	4.9	197.4
1940	1.432	32.2	4.4	329.9	6.6	-2.2	195.2
41	1.124	42.5	2.6	330.4	6.6	-4.0	191.2
42	1.280	53.5	2.4	329.1	6.6	-4.2	187.0
43	1.115	52.5	2.1	329.0	6.6	-4.5	182.5
44	1.520	67.2	2.3	327.1	6.5	-4.2	178.3
45	2.454	86.9	2.8	325.3	6.5	-3.7	174.6
46	5.950	70.5	8.4	328.5	6.6	1.8	176.4
47	8.966	69.5	12.9	338.1	6.8	6.1	182.5
48	13.675	72.9	18.8	353.1	7.1	11.7	194.2
1949	15.625	68.4	22.8	370.4	7.4	15.4	209.6
1950	14.943	67.8	22.0	387.7	7.8	14.2	223.8
51	16.203	77.2	21.0	403.4	8.1	12.9	236.7
52	16.489	89.1	18.5	417.1	8.3	10.2	246.9
53	11.830	82.0	14.4	426.0	8.5	5.9	252.8
54	14.086	78.9	17.9	434.8	8.7	9.2	262.0
55	22.519	82.6	27.3	455.3	9.1	18.2	280.2
56	22.507	91.4	24.6	471.8	9.4	15.2	295.4
57	11.215	97.3	11.5	476.6	9.5	2.0	297.4
58	18.923	97.8	19.3	491.2	9.8	9.5	306.9
59	19.489	98.2	19.8	507.2	10.1	9.7	316.6
1960	16.834	100.0	16.8	519.7	10.4	6.4	323.0
61	15.269	102.0	15.0	528.6	10.6	4.4	327.4
62	22.796	103.2	22.1	544.6	10.9	11.2	338.6
63	30.032	108.3	27.7	565.9	11.3	16.4	355.0
64	25.413	113.1	22.5	583.6	11.7	10.8	365.8
65	30.918	125.4	24.7	607.0	12.1	12.6	378.4
66	30.349	132.1	23.0	628.7	12.6	10.4	388.8
67	19.050	132.2	14.4	642.1	12.8	1.6	390.4

Table 3-3

Total Net Fixed Capital Formation and Capital Stock in Egyptian Industry, 1899-1967

(Constant 1960 Prices)

£.E.million

Year	NFCF (1)	NFCS (2)	Year	NFCF (1)	NFCS (2)
1899		89.0	1934	5.7	242.3
1900	5.1	94.1	35	7.3	249.6
1	6.1	100.2	36	4.3	253.9
2	4.2	104.4	37	7.5	261.4
3	5.2	109.6	38	5.0	266.4
4	11.9	121.5	39	5.0	271.4
5	6.9	128.4	1940	-7.2	264.2
6	9.2	137.6	41	-9.9	254.3
7	6.3	143.9	42	-9.8	244.5
8	1.3	145.2	43	-10.4	234.1
9	-1.2	144.0	44	-8.8	225.3
1910	-0.2	143.8	45	-5.7	219.6
11	3.4	147.2	46	7.9	227.5
12	3.4	150.6	47	16.7	244.2
13	3.9	154.5	48	29.9	274.1
14	-0.1	154.4	49	36.2	310.3
15	-6.8	147.6	1950	32.4	342.7
16	-6.2	141.4	51	29.7	372.4
17	-6.5	134.9	52	24.4	396.8
18	-5.7	129.3	53	11.9	408.7
19	-3.2	126.0	54	18.1	426.8
1920	4.7	130.7	55	39.4	466.2
21	5.3	136.0	56	33.0	499.2
22	-1.8	134.2	57	2.1	501.3
23	5.1	139.3	58	22.7	524.0
24	7.5	146.8	59	22.6	546.6
25	13.2	160.0	1960	12.9	559.5
26	6.8	166.8	61	0.4	559.9
27	6.1	172.9	62	21.4	581.3
28	8.0	180.9	63	34.8	616.1
29	13.2	194.1	64	14.4	630.5
1930	19.8	213.9	65	17.2	647.7
31	13.5	227.4	66	24.3	672.0
32	6.4	233.8	67	10.0	682.0
33	2.8	236.6			

try (1899-1967) resulting from all the above calculations are presented in the following tables:

Tables 3-1 and 3-2: the different flows and stocks series for machinery and buildings separately.

Table 3-3: total NFCF and NFCS in industry at 1960 prices which is a summation of NFCF and NFCS in machinery and buildings.

3.4 Reliability of the Estimates

The assessment of the reliability of the present estimates and the estimation of the margins of error to which they are subject, are extremely difficult. Significant errors, in this as in all other national accounting statistics, are those which result from adopting faulty concepts, errors of classification and errors in the estimating procedure, and which cannot in general be quantified.

An alternative approach which partially compensates for the absence of statistically accurate measures of reliability consists of a critical study of the definitions, the sources of data and the estimation approach, as well as a comparison of the resulting estimate with the results of other measurements of the same variables. At each step of the estimation, statistical sources were described in such a way as to reveal the areas of weakness and where crude estimating techniques had to be used in order to bridge the gap left by inadequate data. Moreover, the estimating methods were fully described (in Chapter I as well as in this chapter) so that the users of the estimates could judge the reliability of the figures and estimates derived from them. However three general limitations should be pointed out here. First, our method is open to the common criticism of the commodity-flow approach; namely that it is based on import figures, and hence the CF series reflect essentially fluctuations in imports. Secondly, our choice of the industrial buildings mark-up ratios, on which the stock and flow estimates of such a major component depend, remain

somewhat arbitrary especially before the 1930's, despite all the attempts to approximate these ratios to reality. Thirdly, the aggregate way in which Egyptian import statistics are reported made it impossible to break-down our estimates by industrial activity.

Finally, comparisons of the present series of capital formation and Capital Stock in industry with other available measurements of the same magnitude, reveal a reasonable degree of consistency with the general trend, but not necessarily the exact rate of change:

1. For the early period, the only comparable figures available are those on the paid-up capital of industrial joint-stock companies operating in Egypt for the years 1899-1933. Table 3-4 and Figure 3.1 show that, on the whole, both the paid-up capital (at current prices) and NFCS (at constant prices) in industry have moved roughly in the same direction, though the rate of change in the latter was much smoother than in the former. One would of course expect differences between the two series from the different depreciation rates assumed in the companies' accounts and rates adopted in the present study.

2. For the post-war period, a number of comparisons become possible; comparisons of the present series with previous estimates of NFCS in Egyptian industry (Table 3-5, Figure 3.2), as well as other available indicators such as the index of motive power used in industry (Table 3-6, Figure 3.3), reveal an even closer association between those measurements and our series of NFCS.

Table 3-4

Comparison of NFCS in Industry with Paid-up Capital of Joint-Stock Companies

1900-4 - 1930-34

£.E. million

	Paid-up Capital		NFCS in Industry	
	£E.m.	Index	£E.m.	Index
1900-4	4.6	100.0	96.7	100.0
1905-9	11.7	254.3	143.9	148.8
1910-14	13.2	287.0	150.8	155.9
1915-19	13.1	284.8	136.8	141.5
1920-24	13.6	295.7	137.8	142.5
1925-29	14.0	304.3	174.9	180.9
1930-34	15.2	330.4	227.9	235.7

Sources: Figures on paid-up capital of industrial joint-stock companies (at current prices) from Appendix Table A-15, and on NFCS (at constant 1960 prices) from Table 3-3.

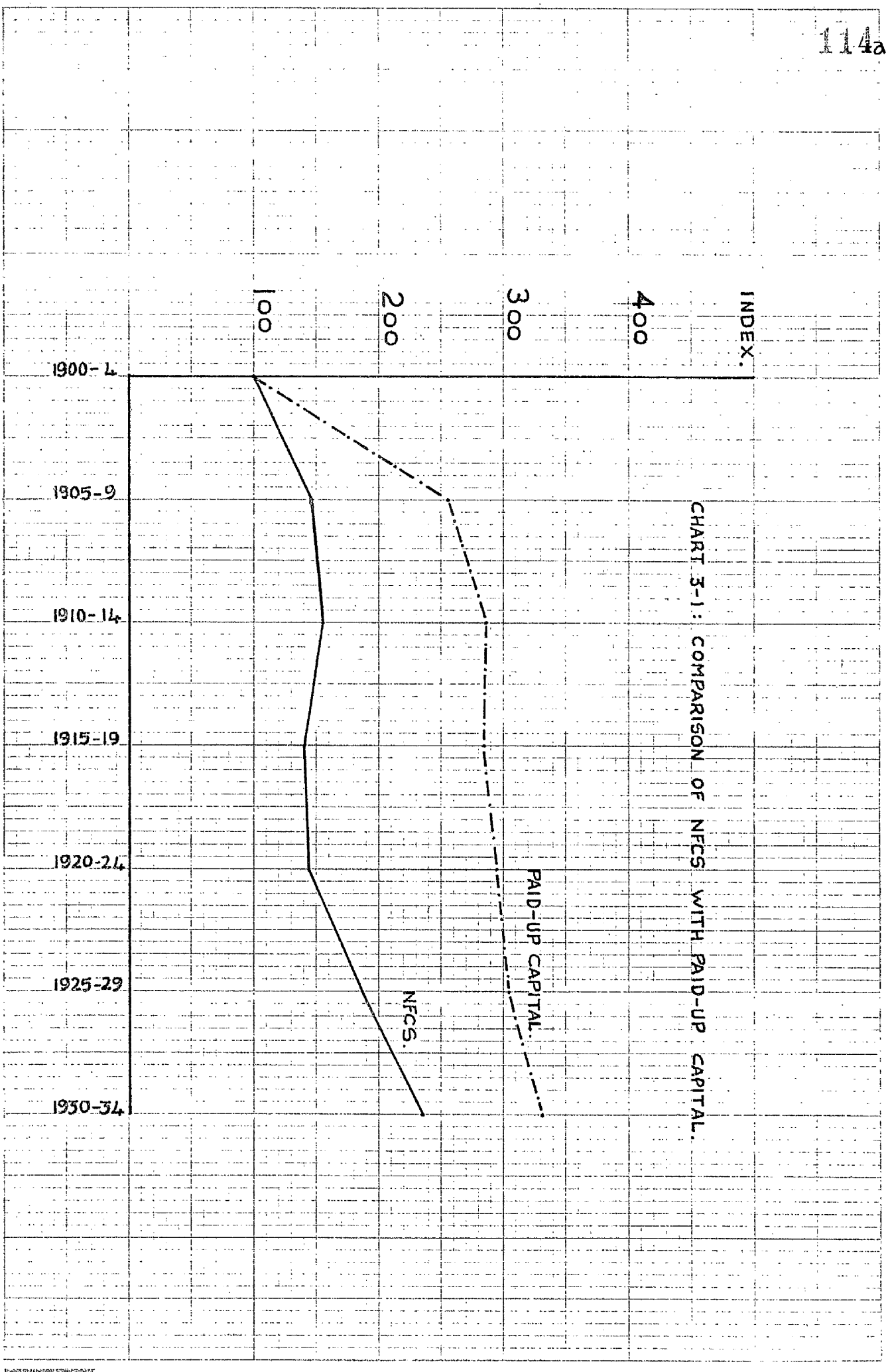


CHART 3-1: COMPARISON OF NFCS WITH PAID-UP CAPITAL.

Table 3-5

Comparison with other Estimates of Capital Stock in Egyptian Industry

Indices, 1960=100

Year	(1) Hansen & Marzouk	(2) Mead	(3) Mabro	(4) Present Estimate
1945		29		39
1947			37	44
1948			40	49
1949			47	55
1950	49	56	53	61
1951			59	67
1952	58		65	71
1953			69	73
1954		73	74	76
1955			78	83
1956			85	89
1957			87	90
1958			90	94
1959			94	98
1960	100	100	100	100

Sources: (1) B. Hansen and G. A. Marzouk, Development and Economic Policy in the U.A.R. (Egypt) Amsterdam, 1965, Table 5.10, p.129 (Alternative 4).

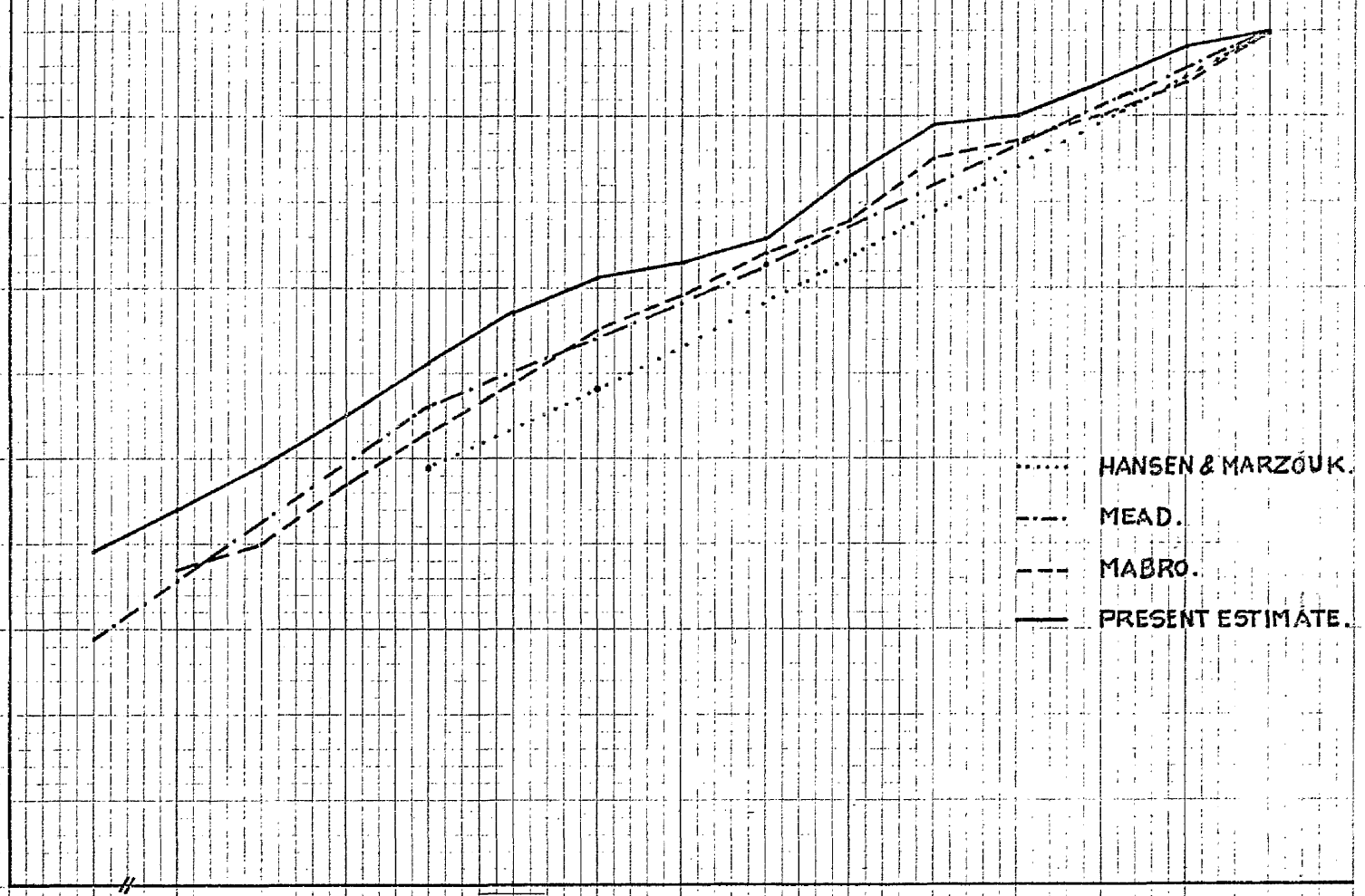
(2) D. C. Mead, Growth and Structural Change in the Egyptian Economy, Illinois, 1967, Table 5-6, p.113.

(3) R. Mabro in the Journal of Development Studies, Vol. III, No. 4, July, 1967, Table 8, p.341, (Alternative I for total industry).

(4) Table 3.3 above.

CHART 3-2 : COMPARISON OF DIFFERENT ESTIMATES OF INDUSTRIAL NFCS

1945-1960



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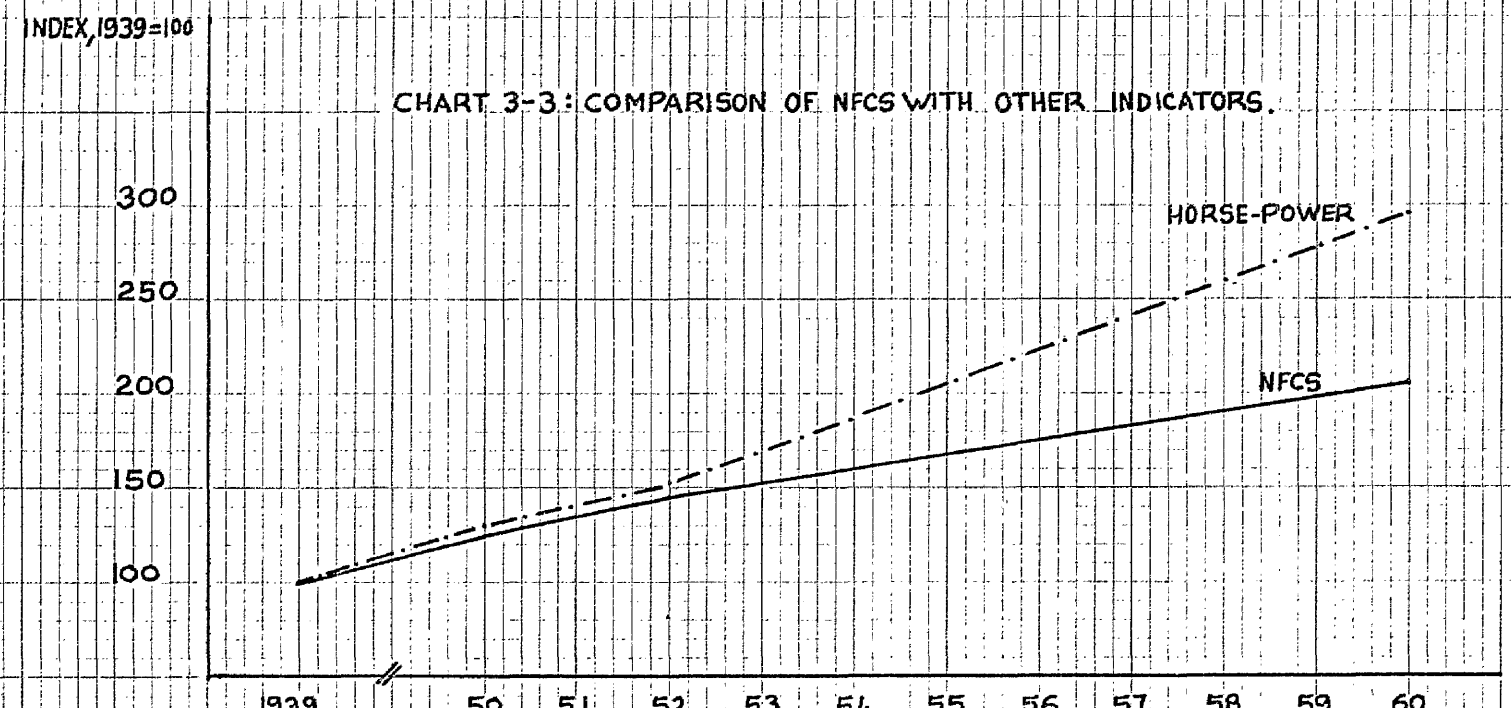

CHART 3-3: COMPARISON OF NFCS WITH OTHER INDICATORS.

CHAPTER FOUR

LONG TERM TRENDS IN AGRICULTURAL CAPITAL FORMATION, 1882-1967

4.1 Long-Term Growth Pattern

Table 4.1 and the accompanying chart (4.1) provide us with a summary view of the changes in the level and structure of CF in Egyptian agriculture over the period 1822-1967. Two features appear very clearly;

i) Taking the period as a whole, the series shows an upward trend in the level of C.F. Over the last 85 years, agricultural capital stock has increased by more than nine times, with an average annual rate of growth of 2.6%,

(ii) This growth of C.S. was by no means even. Our series suggests that development during that period took the form of a series of surges in the rate of C.F. followed by periods of retarded growth. The duration of these alternating fluctuations, varying between 13-25 years, implies the existence of long-swings of the variety known as the 'Kuznets Cycle'.[1]

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1. Kuznets defines long swings as "up and down movements extending over periods substantially longer than those associated with business cycles (four years to eleven years). But these periods must be sufficiently brief so that the swings can be detected in series extending over secular stretches observable in social data, at most over a century and a half to two centuries. It follows that the duration of the swings so defined is limited to a range from over a decade to not much longer than half a century". S. Kuznets, Economic Growth and Structure, Selected Essays, London, 1965, p.328. Kuznets first discussed such swings in economic activity in his study Secular Movements in Production and Prices, Boston: Houghton Mifflin, 1930, where he called them "secondary secular movements". Later on the concept was developed by Kuznets himself "Quantitative Aspects of the Economic Growth of Nations: I. Levels and Variability of Rates of Growth, Economic Development and Cultural Change, Oct. 1956, W. Arthur Lewis, "Secular Swings in Production and Trade", Manchester School of Economic and Social Studies, XXIII, May 1955, K. Ohkawa and H. Rosovsky, "Postwar Japanese Growth in Historical Perspective: A Second Look", in L. Klein and K. Ohkawa (eds.), Economic Growth: the Japanese Experience Since the

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Table 4-1

Capital Formation in Egyptian Agriculture, 1882-1967

(Constant 1960 Prices) £.E.million

Year	Irrigation and Drainage			Dwellings and Farm Buildings			Livestock			Machinery			Total		Annual Rate of Growth of Total NFCS
	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	
1882	-	49.1	50.2	-	16.1	16.4	-	31.2	31.9	-	1.5	1.5	-	97.9	
83	0.3	49.4	49.7	0.5	16.6	16.7	0.7	31.9	32.1	0.0	1.5	1.5	1.5	99.4	1.5
84	0.3	49.7	49.3	0.5	17.1	16.9	0.6	32.5	32.2	0.1	1.6	1.6	1.5	100.9	1.5
85	0.5	50.2	48.9	0.5	17.6	17.1	0.7	33.2	32.4	0.0	1.6	1.6	1.7	102.6	1.7
86	0.6	50.8	48.7	0.5	18.1	17.3	0.7	33.9	32.5	0.0	1.6	1.5	1.8	104.4	1.8
87	2.1	52.9	49.2	0.5	18.6	17.3	0.5	34.4	32.0	0.0	1.6	1.5	3.1	107.5	3.0
88	2.1	55.0	49.7	0.5	19.1	17.3	0.5	34.9	31.5	0.1	1.7	1.5	3.2	110.7	3.0
89	0.9	55.9	49.6	0.5	19.6	17.4	0.6	35.5	31.5	0.0	1.7	1.5	2.0	112.7	1.8
1890	2.3	58.2	50.2	0.5	20.1	17.3	0.4	35.9	30.9	0.1	1.8	1.6	3.3	116.0	2.9
91	1.8	60.0	50.5	0.4	20.5	17.2	0.7	36.6	30.8	0.0	1.8	1.5	2.9	118.9	2.5
92	0.7	60.7	50.3	0.5	21.0	17.4	0.5	37.1	30.7	0.1	1.9	1.6	1.8	120.7	1.5
93	0.2	60.9	49.9	0.5	21.5	17.6	0.6	37.7	30.9	0.0	1.9	1.6	1.3	122.0	1.1
94	0.2	61.1	49.5	0.5	22.0	17.8	0.6	38.3	31.1	0.1	2.0	1.6	1.4	123.4	1.1
95	0.0	61.1	49.0	0.5	22.5	18.1	0.7	39.0	31.3	0.0	2.0	1.6	1.2	124.6	1.0
96	0.0	61.1	48.5	0.5	23.0	18.3	0.8	39.8	31.6	0.0	2.0	1.6	1.3	125.9	1.0
97	1.5	62.6	48.1	2.2	25.2	19.3	0.7	40.5	31.1	0.0	2.0	1.5	4.4	130.3	3.5
98	2.0	64.6	48.8	0.3	25.5	19.3	-0.2	40.3	30.4	0.0	2.0	1.5	2.1	132.4	1.6
99	2.2	66.8	49.3	0.6	26.1	19.3	0.3	40.6	29.9	0.1	2.1	1.5	3.2	135.6	2.4
1900	2.3	69.1	50.4	0.5	26.6	19.4	-1.2	39.4	28.7	0.0	2.1	1.5	1.6	137.2	1.2
1	4.1	73.2	50.8	0.6	27.2	18.9	2.2	41.6	28.9	0.0	2.1	1.4	6.9	144.1	5.0
2	9.3	82.5	52.7	0.7	27.9	17.8	2.3	43.9	28.1	0.1	2.2	1.4	12.4	156.5	8.6
3	8.0	90.5	53.9	0.4	28.3	16.8	3.1	47.0	28.0	0.0	2.2	1.3	11.5	168.0	7.4
4	3.7	94.2	54.4	0.6	28.9	16.7	0.7	47.7	27.6	0.1	2.3(a)	1.3	5.1	173.1(a)	3.0
5	5.1	99.3	54.7	0.6	29.5	16.2	2.9	50.6	27.8	0.0	2.3(b)	1.3	8.6	181.7(b)	5.0
			53.7			15.9			27.4		5.6(b)	3.0		185.0(b)	1.8
6	7.7	107.0	53.1	0.6	30.1	15.0	6.7	57.3	28.4	1.5	7.1	3.5	16.5	201.5	8.9

(a) Includes traditional tools and implements only. Comparable with earlier years.
(b) Includes machinery. Comparable with later years.

Year	Irrigation and Drainage			Dwellings and Farm Buildings			Livestock			Machinery			Total		Annual Rate of Growth of Total NFCS
	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	
7	8.8	115.8	54.6	1.2	31.3	14.8	-1.1	56.2	26.5	1.5	8.6	4.1	10.4	211.9	5.2
8	9.2	125.0	57.2	0.2	31.5	14.4	-3.4	52.8	24.1	0.8	9.4	4.3	6.8	218.7	3.2
9	7.5	132.5	59.3	0.1	31.6	14.1	-3.4	49.4	22.1	0.7	10.1	4.5	4.9	223.6	2.2
1910	6.1	138.6	62.1	0.1	31.7	14.2	-6.7	42.7	19.1	0.2	10.3	4.6	-0.3	223.3	-0.1
11	3.6	142.2	62.9	0.2	31.9	14.1	-1.6	41.1	18.2	0.5	10.8	4.8	2.7	226.0	1.2
12	3.5	145.7	63.8	0.2	32.1	14.1	-1.8	39.3	17.2	0.5	11.3	4.9	2.4	228.4	1.1
13	3.2	148.9	64.0	0.1	32.2	13.8	0.0	39.3	16.9	1.1	12.4	5.3	4.4	232.8	1.9
14	3.0	151.9	65.4	0.3	32.5	14.0	-4.8	34.5	14.8	1.1	13.5	5.8	-0.4	232.4	-0.2
15	1.1	153.0	66.5	0.2	32.7	14.2	-2.9	31.6	13.7	-0.6	12.9	5.6	-2.2	230.2	-0.9
16	0.9	153.9	67.2	0.1	32.8	14.3	-1.7	29.9	13.1	-0.6	12.3	5.4	-1.3	228.9	-0.6
17	1.1	155.0	65.3	0.3	33.1	14.0	7.6	37.5	15.8	-0.6	11.7	4.9	8.4	237.3	3.7
18	1.1	156.1	65.6	0.2	33.3	14.0	-0.1	37.4	15.7	-0.7	11.0	4.7	0.5	237.8	0.2
19	0.8	156.9	65.9	0.4	33.7	14.2	-0.1	37.3	15.6	-0.7	10.3	4.3	0.4	238.2	0.2
1920	1.8	158.7	65.2	0.8	34.5	14.2	3.0	40.3	16.5	-0.2	10.1	4.1	5.4	243.6	2.3
21	1.5	160.2	63.7	0.5	35.0	13.9	6.4	46.7	18.6	-0.6	9.5	3.8	7.8	251.4	3.2
22	0.9	161.1	64.9	0.7	35.7	14.4	-4.2	42.5	17.1	-0.6	8.9	3.6	-3.2	248.2	-1.3
23	1.0	162.1	64.2	0.7	36.4	14.4	2.8	45.3	18.0	-0.4	8.5	3.4	4.1	252.3	1.7
24	1.5	163.6	62.7	0.5	36.9	14.1	7.0	52.3	20.0	-0.3	8.2	3.2	8.7	261.0	3.4
25	1.8	165.4	63.1	0.7	37.6	14.4	-1.8	50.5	19.3	0.3	8.5	3.2	1.0	262.0	0.4
26	2.1	167.5	62.2	0.7	38.3	14.2	4.5	55.0	20.4	0.0	8.5	3.2	7.3	269.3	2.8
27	3.6	171.1	62.4	0.4	38.7	14.2	0.8	55.8	20.4	-0.1	8.4	3.0	4.7	274.0	1.7
28	5.3	176.4	62.6	0.8	39.5	14.0	1.4	57.2	20.3	0.2	8.6	3.1	7.7	281.7	2.8
29	10.0	186.4	63.5	0.9	40.4	13.8	0.5	57.7	19.6	0.6	9.2	3.1	12.0	293.7	4.3
1930	11.8	198.2	64.0	0.6	41.0	13.2	3.4	61.1	19.7	0.3	9.5	3.1	16.1	309.8	5.5
31	13.6	211.8	65.0	0.7	41.7	12.8	1.3	62.4	19.2	0.2	9.7	3.0	15.8	325.6	5.1
32	18.0	229.8	66.1	0.7	42.4	12.2	3.3	65.7	18.9	0.0	9.7	2.8	22.0	347.6	6.8
33	15.3	245.1	67.4	0.7	43.1	11.9	0.0	65.7	18.1	0.0	9.7	2.6	16.0	363.6	4.6
34	17.6	262.7	67.9	0.8	43.9	11.4	4.5	70.2	18.2	0.1	9.8	2.5	23.0	386.6	6.3
35	18.1	280.8	69.4	0.4	44.3	10.9	-0.6	69.6	17.2	0.3	10.1	2.5	18.2	404.8	4.7
36	16.3	297.1	70.3	0.7	45.0	10.6	0.6	70.2	16.6	0.4	10.5	2.5	18.0	422.8	4.4
37	16.4	313.5	69.3	1.0	46.0	10.2	11.6	81.8	18.1	0.6	11.1	2.4	29.6	452.4	7.0
38	16.2	329.7	71.1	-0.3	45.7	9.8	-4.8	77.0	16.6	0.5	11.6	2.5	11.6	464.0	2.6
39	16.7	346.4	72.1	0.0	45.7	9.5	-0.6	76.4	15.9	0.2	11.8	2.5	16.3	480.3	3.5
1940	6.7	353.1	73.4	0.0	45.7	9.5	-6.0	70.4	14.6	0.1	11.9	2.5	0.8	481.1	0.2

Year	Irrigation and Drainage			Dwellings and Farm Buildings			Livestock			Machinery			Total		Annual Rate of Growth of Total NFCS
	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	% of NFCS to total	NFCF	NFCS	
41	2.9	356.0	74.2	-0.1	45.6	9.5	-4.0x	66.4	13.8	-0.1	11.8	2.5	-1.3	479.8	-0.3
42	2.4	358.4	73.4	0.0	45.6	9.3	6.3	72.7	14.9	-0.2	11.6	2.4	8.5	488.3	1.8
43	2.3	360.7	72.8	-0.1	45.5	9.2	5.3	78.0	15.7	-0.4	11.2	2.3	7.1	495.4	1.5
44	2.3	363.0	72.3	0.2	45.7	9.1	3.9	81.9	16.3	0.1	11.3	2.3	6.5	501.9	1.3
45	2.0	365.0	72.0	-0.3	45.4	8.9	3.3	85.4	16.8	0.5	11.8	2.3	5.5	507.6	1.1
46	5.4	370.4	70.2	0.3	45.7	8.7	13.5	98.9	18.7	0.6	12.4	2.4	19.8	527.4	3.9
47	6.0	376.4	69.1	-0.2	45.5	8.3	11.2	110.1	20.2	0.6	13.0	2.4	17.6	545.0	3.3
48	3.9	380.3	70.2	0.1	45.6	8.4	-9.7	100.4	18.6	2.2	15.2	2.8	-3.5	541.5	-0.6
49	4.0	384.3	71.4	0.0	45.6	8.5	-8.7	91.7	17.0	1.7	16.9	3.1	-3.0	538.5	-0.6
1950	4.2	388.5	71.8	0.3	45.9	8.5	-5.0	86.7	16.0	3.1	20.0	3.7	2.6	541.1	0.5
51	3.6	392.1	72.7	-0.2	45.7	8.5	-9.1	77.6	14.4	3.6	23.6	4.4	-2.1	539.0	-0.4
52	5.3	397.4	73.6	0.4	46.1	8.5	-6.5	71.1	13.2	1.5	25.1	4.7	0.7	539.7	0.1
53	8.0	405.4	74.0	-0.2	45.9	8.4	0.3	71.4	13.0	0.3	25.4	4.6	8.4	548.1	1.6
54	11.5	416.9	74.3	0.5	46.4	8.3	-0.2	71.2	12.7	0.8	26.2	4.7	12.6	560.7	2.3
55	12.0	428.9	74.1	-0.2	46.2	8.1	4.7	75.9	13.1	1.3	27.5	4.7	17.8	578.5	3.2
56	10.2	439.1	74.3	0.5	46.7	7.9	0.2	76.1	12.9	1.7	29.2	4.9	12.6	591.1	2.2
57	7.6	446.7	74.4	0.2	46.9	7.8	0.4	76.5	12.7	1.4	30.6	5.1	9.6	600.7	1.6
58	7.3	454.0	74.5	0.3	47.2	7.7	0.2	76.7	12.6	1.1	31.7	5.2	8.9	609.6	1.5
59	9.8	463.8	74.1	0.2	47.4	7.6	4.4	81.1	12.9	1.9	33.6	5.4	16.3	625.9	2.7
1960	12.8	476.6	74.0	0.2	47.6	7.4	4.1	85.2	13.2	0.9	34.5	5.4	18.0	643.9	2.9
61	20.2	496.8	74.7	4.2	51.8	7.8	-3.7	81.5	12.3	0.3	34.8	5.2	21.0	664.9	3.3
62	29.9	526.7	73.8	4.1	55.9	7.8	10.9	92.4	12.9	4.3	39.1	5.5	49.2	714.1	7.4
63	44.1	570.8	74.4	4.0	59.9	7.8	-0.4	92.0	12.0	5.3	44.4	5.8	53.0	767.1	7.4
64	55.8	626.6	75.5	3.9	63.8	7.7	0.1	92.1	11.1	2.6	47.0	5.7	62.4	829.5	8.1
65	41.0	667.6	76.4	3.7	67.5	7.7	-0.4	91.7	10.5	0.2	47.2	5.4	44.5	874.0	5.4
66	33.0	700.6	76.8	3.5	71.0	7.8	0.2	91.9	10.1	1.2	48.4	5.3	37.9	911.9	4.3
67	29.3	729.9	77.1	0.2	71.2	7.5	4.3	96.2	10.2	1.1	49.5	5.2	34.9	946.8	3.8

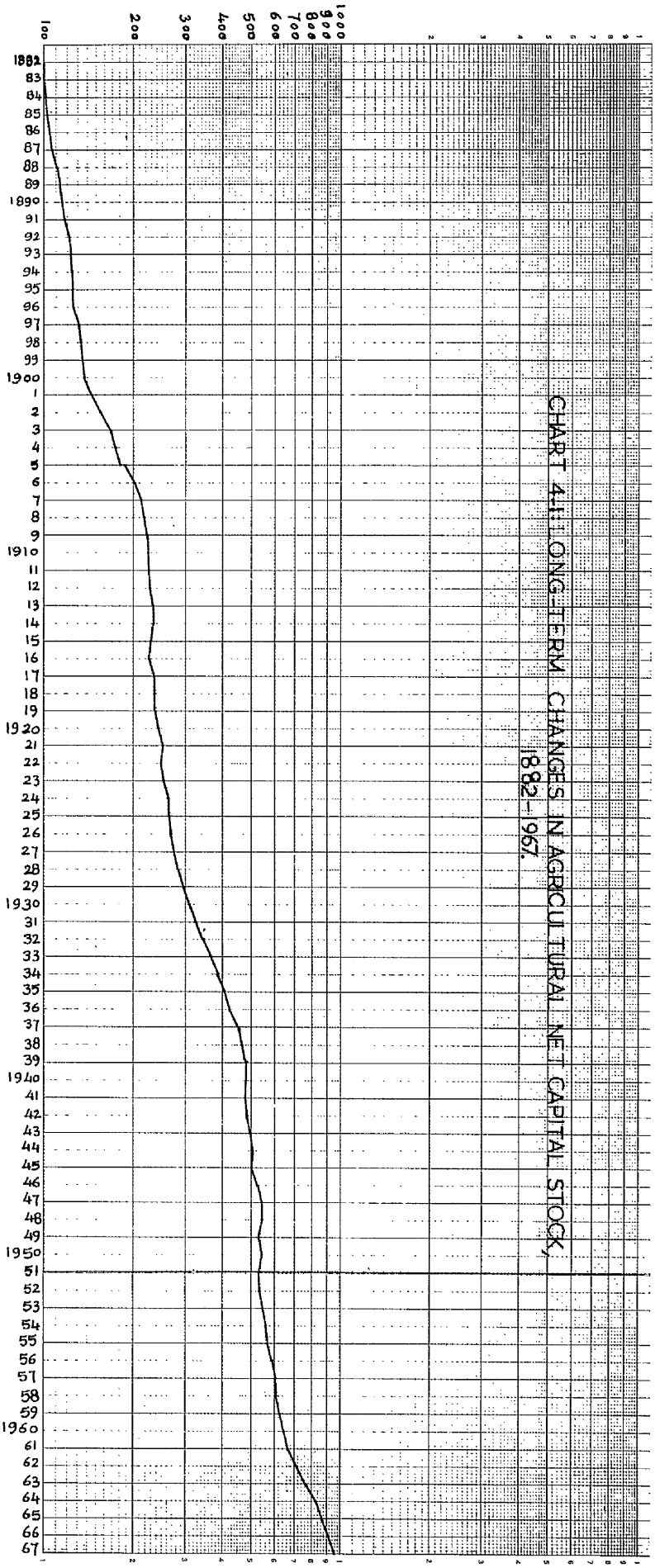

CHART 4:1: LONG-TERM CHANGES IN AGRICULTURAL NET CAPITAL STOCK, 1882–1967.

The 85 years between 1882 and 1967 could be subdivided into segments of unequal length where each segment refers to either an upswing or a downswing of a long swing. Table 4-2 shows clearly that the three periods, 1882-1907, 1920-1939 and 1952-1967, where the respective average annual rates of growth of NFCS in Egyptian agriculture were as high as 3.01, 3.63 and 3.80% represent distinctive 'investment spurts' or upswings. On the other hand, the two remaining periods, 1907-1920 and 1939-1952, were periods of much slower investment growth, or downswings. Average annual rate of growth of NFCS amounted only to 1.08 and 0.88% in the two periods respectively.

TABLE 4-2

Period	No. of Years	Average Annual Level of NFCF L.E.M.	Average Annual Rate of Growth of NFCS %
I. 1882-1907	25	4.5	3.01
II. 1907-1920	13	2.4	1.08
III. 1920-1939	19	12.5	3.63
IV. 1939-1952	13	4.6	0.88
V. 1952-1967	15	27.1	3.80

It is interesting at this point to note that these long swings in the rate of growth of C.S., which will constitute the basis of our periodization, also appear, perhaps with greater

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Meiji Era, Homewood, 1968, pp.3-34. For an application of the concept of swings to capital formation, see S. Kuznets, Capital in the American Economy, its Formation and Finance, N.B.E.R., Princeton University Press, 1961, especially Chapters 7 and 8, pp.316-388, and Moses Abramovitz in N.B.E.R., 37th Annual Report, May 1957, pp.72-75. Finally, for a comprehensive survey of the subject see M. Abramovitz, "The Nature and Significance of Kuznets Cycles". Economic Development and Cultural Change, Vol. IX, No. 3, April 1961, pp.225-248. It should be stated at this point, however, that my view of the swing phenomenon does not require anything like a self-contained cycle theory, for this reason the term 'Long cycle' or 'Kuznets cycle' are avoided in the present study.

amplitude, in the growth of total agricultural output.[2] It is evident from Table 4-3 and Chart 4-2 that during the period 1895/9-1960/2, agricultural output, though growing at a slower rate than C.S., has followed a similar path. The timing and duration of secular movements in agricultural output seem to correspond closely to those of C.S.

TABLE 4-3

GROWTH INDICES OF AGRICULTURAL OUTPUT & C.S.

Period	Agricultural Output		Capital Stock in Agriculture	
	Index 1895/9=100 (1)	Average Annual Rate of Growth % (2)	Index 1895/9=100 (3)	Average Annual Rate of Growth % (4)
1895-9	100	-	100	-
1900-4	110	1.9	120	3.7
1905-9	116	1.0	160	5.9
1910-14	121	0.8	176	1.9
1915-19	103	-2.8	181	0.6
1920-24	113	1.9	194	1.4
1925-29	133	3.4	213	1.9
1930-34	135	0.3	267	4.6
1935-39	153	2.4	343	5.1
1940-44	131	-2.7	377	1.9
1945-49	140	1.4	410	1.7
1950-54	150	1.4	420	0.5
1955-59	184	4.2	463	1.9
1960-62	204	3.5	519	2.3

NOTES AND SOURCES:

(1) The total agricultural output index is that of P.K. O'Brien, "The Long-Term Growth of Agricultural Production in Egypt: 1821-1962" in P.M. Holt (ed.), Political & Social Change in Modern Egypt, London 1968, pp.162-195. The index is an average of physical output of the eight major land crops (accounting for not less than 63% of gross agricultural production), weighted by the importance of each crop measured in terms of its proportionate contribution to the aggregate gross value of all eight crops. This index is subject to two main qualifications: first, figures for the period up to 1912 should be treated with caution as they are based on State Domains figures for yields which were usually higher than the national average and, therefore, production figures for the years 1885-1912 might be overstated. Secondly, though the index covers the important field crops, it excludes vegetables and fruits whose importance have been increasing as a result of reallocation of land in their favour especially since the 1950's. Nevertheless, the index provides a useful indicator of the general trend of growth in agricultural output.

(3) Based on 5-year averages of capital stock calculated from Table 4-1.

2. Due to lack of data no rigorous attempt is made here to establish whether these long swings in C.F. have certain systematic association with some other standard measures of economic performance. However, available figures on the growth of total agricultural output are used as a cross-check of the valitidy of our periodization.

CHART 4.2

AVERAGE ANNUAL RATES OF GROWTH OF AGRICULTURAL OUTPUT & CAPITAL STOCK.

An important implication of the pattern of growth of C.F. discussed above is that we can identify distinctive periods where investment activity differs radically. It is proposed, therefore, to subdivide the 85 years of our study into the following periods:

I. 1882-1907: a high rate of growth of C.F. from a low level of capital stock. A slow start that develops into a sharp upswing at the turn of the century. This reflects the effect of basic investment in irrigation works especially dams and barrages.

II. 1907-1920: slow-down as the period opens with the 1907 slump. Slight recovery in 1911 and 1912 associated with the heightening of Aswan Dam. Conditions created by the Great War cause a downswing that persists until 1919.

III. 1920-1939: slow recovery interrupted by the agricultural crises of 1921, 1926 and 1931. Sharp upswing following the Great Depression until the end of the period. Resumption of investment in irrigation works and the launching of a wide network of drainage works.

IV. 1939-1952: the Second World War puts an end to interwar expansion due to lack of local investment and absence of imported goods. Slow recovery by 1946 reflecting mainly replacement effort and the last of the barrages at Edfina. Virtual stagnation up to 1952.

V. 1952-1967: the third and last investment spurt; slow progress up to 1957 then fast acceleration up to 1966 due to the Government's plans for 'horizontal expansion' by building the High Dam (the last stage in the great works to control the Nile),

and 'vertical expansion' by improving the drainage system and mechanization especially in newly-reclaimed areas. The period ends with a tail-off which implies that Egypt has virtually reached the frontier of her arable land.

4.2 Interpretation of Movements in Agricultural Capital Formation

Having established the pattern of historical fluctuations in C.F. we now ask: what needs to be explained? An attempt should be made to answer two related questions:

i) What were the common and distinctive characteristics of each period?

ii) What were the broad factors affecting the level of C.F. in each investment swing? In other words, what were the forces that prompted an investment spurt and those that brought about a downswing? Were these factors exogenous (wars, depressions...) or internal (government policy, farmers' behaviour, institutions...)?

In the following pages an attempt will be made to answer these questions and assess the impact of various factors affecting the progress of capital accumulation in each of the five periods suggested above.

4.2.1. 1882-1907:

Available figures on the growth of agricultural output indicate that Egypt has experienced something like an 'agrarian revolution' during the course of the 19th century. Over the fifty years between 1821 and 1872-8, total agricultural output increased just over 12 times, while per capita production rose nearly six times.[3]

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3. P.K. O'Brien, "The Long-Term Growth of Agricultural Production Egypt: 1821-1962" in P.M.Holt (ed.), Political and Social Change in Modern Egypt, London 1968, pp.180-3. According to O'Brien, other indicators seem to support the case for an agrarian revolution. Exports and imports increased by 12 and 6 times respectively between the 1820's and the 1870's. Government revenue rose from L.E. 1.2m. to L.E. 9.1m. during the same period. As agriculture was the dominant sector of the economy, we can conclude that these substantial additions to exports, imports and public revenue must have rested upon and indicated a corresponding rise in agricultural output.

The impressive expansion in agricultural output during this period could be attributed mainly to two factors: 1) extension of the cultivated area, and ii) reallocation of land in favour of more profitable cash crops especially cotton. These developments were brought about by continued and massive investment by the state in building one of the most complex and sophisticated systems of irrigation in the world. Following the development of summer crops in 1816, and particularly of cotton in 1820, immense amounts of investment and labour were directed, especially under Mohammed Ali (1805-1849) and Ismail (1863-1879), towards the conversion of the ancient system of basin irrigation into perennial irrigation.[4] A wide network of canals covered the Delta and most parts of Middle and Upper Egypt, and the Delta Barrage was built at the bifurcation of the Nile to raise the level of water in those canals during summer.[5] These developments, together with other important factors such as the development of private land ownership, and improvement in transport had far reaching effects on Egyptian agriculture. Between 1821 and 1872-8, cultivated and cropped areas were increased by 56 and 78% respectively.[6] Moreover, the production of cotton rose 50 times, and cotton exports increased from only 944 kantars to 2.5 million kantars during the same period.[7]

After half a century of fast growth, followed a period of two decades of steady but much less spectacular advance. Annual average

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4. See pp. 25-7 of chapter 2 above, A.E. Crouchley, Economic Development of Modern Egypt, London 1938, pp.53-7, and 131-2, and Helen A.B. Rivlin, The agricultural policy of Mohammed Ali in Egypt, Harvard University Press, Cambridge, Mass; 1961, chapter XII, pp.213-249.
5. see pp. 26-7 of chapter 2 above.
6. Crouchley, op.cit., Table 3, p.259.
7. Ibid., Table 5A, pp.262-3.

rate of growth of agricultural output amounted to 3.5% during the period 1872-8 to 1895-9, compared to more than 5% over the previous 50 years.[8] The main explanation for this relatively slower rate of growth can be found in the fact that by the 1880's, Egypt had reached that stage which Ishikawa calls 'the virtual disappearance of the arable land frontier' where a new round of 'basic investment' in irrigation and flood control becomes an essential precondition for any further addition to the extensive margin of land and increase in agricultural output.[9]

It was not until the 1890's that the Government could embark on such a task. Following the occupation of Egypt (1882), the chief concern of the Government was to restore financial solvency. The public debt stood at L.E.100m. and the payment of interest and tribute absorbed half of the country's export earnings[10] which left little resources for investment. Despite the declared policy of retrenchment, the Government realized that any progress was dependent on increased agricultural production. In 1885, a loan of L.E.2m. was contracted to be spent on improving the existing irrigation system. The main work done was the restoration of the Delta Barrage into working order and the completion of the three high level canals which connect it with the irrigation networks in the Delta. Once this work was completed, in 1891, the extra water made available throughout Lower Egypt led to a marked rise in agricultural productivity.[11] Not only was much new land brought into cultivation, but it was also possible to use the existing land

8. O'Brien, op.cit., Table 9, p.185.

9. S. Ishikawa, Economic Development in Asian Perspective, Tokyo, Japan 1967, chapter 2, pp.57-83.

10. Crouchley, op.cit., p.145.

11. E.R. Owen, "Agricultural Production in Historical Perspective: A case Study of the Period 1890-1939", in P.J. Vatikiotis (ed.), Egypt Since the Revolution, London 1968, pp.50-51.

more intensively by growing additional crops during summer. Moreover, the annual corvée for cleaning canals was ended, and the use of free-flow irrigation replaced the laborious lifting and pumping hitherto employed.

The sucess of the Delta Barrage soon led to other big irrigation projects. It was clear that Egypt's irrigation needs demanded more comprehensive schemes of water storage if every part of the cultivable land was to realize its full potential by growing crops all the year round. During the decade 1898-1907, an intensive programme of investment by the government, financed from local and foriegn sources[12], resulted in the construction of a series of dams and barrages along the Nile ⌈Aswan (1898-1902,) Assiut (1902), Zifta (1901-3), and Esna (1906-8)⌋ which made possible the conversion of all the Delta and Middle-Egypt into perennial irrigation and insured regular provision of water to the basins in upper Egypt.[13] Consequently, there was a marked increase in both cultivated and cropped areas, which increased between 1898 and 1907, by 6% and 12% respectively.[14]

These developments could be illustrated by reference to the present series of C.F. in agriculture ⌈Table 4.17⌋ The intensive investment activity which characterized the period as a whole is indicated by the rapid growth of C.S. Starting from a modest level of L.E.97.9m.in 1882,net fixed capital stock fose to L.E.211.9m. in 1907, which suggests an average annual rate of growth of 3.01% Moreover, a closer look at annual figures point out the course of development. The effect of the government's retrenchment policy

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12. The building of the Aswan Dam for example was largely financed by a loan from Ernest Cassel, one of Europe's leading financiers, while the rest came from the reserve fund of the Caisse de la Dette Publique. See R.I. Tignor, Modernization and British Colonial Rule in Egypt: 1882-1914, Princeton 1966, pp.222-3.

13. Crouchley, op.cit., p.152.

14. Appendix Table A-10.

is reflected in the relatively slow rate of growth of NFCS (1.92%) for the first 15 years (1882-1897), during which period the major investment was the repair of the Delta Barrage which shows in the temporary acceleration of the rate of growth from 1.7% to 2.5% between 1885 and 1891. This slow start was soon to develop into a sharp upswing during the following decade where the average rate of growth of C.S. amounted to the impressive level of 4.9% per annum between 1897 and 1907. This acceleration is naturally due to the vast public investment in the major dams and barrages that were built during this period. Finally, it is significant to notice that the growth rate of NFCS after attaining a very impressive level of 8.9% in 1906 (the highest during the entire period), dropped to 5.2% the following year as less investments were directed to public works until the heightening of Aswan dam in 1912.

4.2.2 1907-1920:

In contrast to the previous twenty five years, the period 1907-20 represents a downswing in agricultural investment activity. Additions to fixed capital in Egyptian agriculture amounted to L.E. 2.4m. on average per year, the lowest during the entire period of study. Moreover, the annual average rate of growth of NFCS amounted only to 1.08% compared to 3.01% for 1882-1907 and 3.63% for the interwar period /Table 4.2_7.

In general terms, the explanation for the slower pace of growth during this period is not difficult to find. First of all, the government had completed the second phase of its irrigation projects by building the Aswan Dam and its complementary barrages across the Nile. Consequently, expenditure on new irrigation works for 1907-20 dropped to an annual average of L.E.3.3m. compared to L.E.5.3m. during the previous decade, 1898-1907, /Table 4.1_7. A new round of basic investment was urgently

needed in order to increase the supply of summer water by enlarging the storage capacity of the Aswan Dam, and to decrease the dangerous waterlogging of the subsoil by improving the drainage system.

However, the economic conditions of the country made it difficult to raise money for such important investments. Vulnerable as it was to world economic fluctuations, Egypt was badly hit by the financial crisis of 1907[15]. The investment boom connected with agricultural expansion and the rush of foreign capital into Egypt, which began in the middle of the 19th century, reached its height by 1905-6 in an excess of speculative fever. "The whole movement had developed on the strength of supplies of credit from abroad. Speculators had bought more shares, more land than they could everhold on their own resources. They counted on the credit facilities offered, to hold them until they could dispose of them at a profit, to a buyer who would certainly, in turn, be a speculator himself".[16] The break came in 1907 when the credit from Europe was suddenly cut off following a decline on the American stock market. The crisis had devastating effects on the Egyptian economy in general and the business sector in particular. Hundreds of companies were forced into liquidation[17], building activities in towns were suspended and imports of luxury goods greatly reduced.[18]

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15. On the origin and development of the 1907 crisis see; National Bank of Egypt, National Bank of Egypt, 1898-1948, Cairo 1948, pp. 30-3, A.E. Crouchley, The investment of Foreign Capital in Egyptian Companies and Public Debt, Cairo 1936, pp.64-8, and F. Légrand, Les Fluctuations de Prix et les crises des 1907 et 1908 en Egypte, Nancy 1909.
16. Crouchley, op.cit., p.64.
17. Between 1907 and 1914 not less than 46 companies with a paid-up capital of L.E.8.2m. went into liquidation, Ibid., p.66
18. E.R.J. Owen, Cotton and the Egyptian Economy: 1820-1914, Oxford 1969, pp.284-5.

Repercussions of the crisis were also felt, on a reduced scale, in the agricultural sector. Landowners who had lost their money on the stock exchange found it difficult to provide their estates with working capital.[19] There was also a temporary fall in the purchase of agricultural machinery the imports of which fell from L.E. 247,000 to only L.E. 101,000, or about 55% between 1907 and 1910.[20] The situation was further aggravated by the decline in agricultural output during the years 1907-9 which resulted from a succession of bad harvests together with reduced cotton prices on international markets.[21]

These adverse conditions, from which the economy did not recover until after the start of the 1st World War, led to the decline of agricultural fixed C.F. from L.E. 10.4m. in 1907 to L.E.-0.3m. in 1910 [Table 4.1] Both government and individuals found it difficult to finance new investments, and badly-needed irrigation and drainage projects had to be postponed.[22] Consequently, both cultivated and cropped areas were reduced by about 2% between 1907 and 1911.[23]

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19. Ibid., p.285.

20. Appendix Table A-9 , p. 279 Figures refer to value at current prices.

21. Between 1907/8-1908/9, the cotton crop fell from 7.2m. to 6.7m. kantars as the average yield per feddan decreased from 4.5 to 4.1. Moreover, the value of cotton exports (90% of total exports) declined from L.E.23.3m. to L.E.20.6m. during the same period; Crouchley, Economic Development of Modern Egypt, op.cit., Statistical Appendix, Table 5B pp.263-4.

22. According to Crouchley, government revenue decreased from L.E. 16.8m. in 1907 to L.E.16.3m. in 1910, and government expenditure also fell from L.E.18.9m. to 17.8m. during the same period. Ibid., Statistical Table 5B pp.263-4.

23. During the period 1907-11, cultivated area declined from 5,403 to 5,264 thousand feddans, and cropped area from 7,662 to 7,546 thousand feddans. Appendix Table A-10

Meanwhile, the problem of declining agricultural productivity, which started by the beginning of the present century, had reached alarming proportions. The average yield of cotton fell from 5.47 kantars per feddan in 1895-9 to 4.67 in 1900-4 and 4.27 in 1910-14. Other crops followed the same trend but on a less dramatic scale.[24] This decline in productivity was mainly caused by the exhaustion of the soil due to overcropping, and the dangerous rise in such surface water as investment in drainage was allowed to lag far behind that in water-supply projects.[25] Farmers attempted with little success to check this decline in productivity by applying chemical fertilizers. Inputs of phosphates and nitrogen increased from 2 to 73 thousand tons between 1902 and 1914.[26] While the introduction of this new input was necessary to prevent yeidls from further decline, it was certainly not sufficient to increase productivity. It appears that Egyptian agriculture was still in that stage where basic investment in irrigation and drainage played the role of a "leading input" in the sense that it was the limiting factor of any further increase in productivity, and where the output effect of increased application of fertilizers, improved seeds and farming techniques were dependent on further investment in that leading input.[27]

It was not until 1910 that Egypt was capable of this type of investment. Between 1910 and 1912, the Aswan Dam was heightened by 5 meters which almost doubled the country's supply of summer water.[28]

24. Annuaire Statistique, various issues, and Appendix Table A-12
25. Crouchley, op.cit., p.157.
26. Appendix Table A-11
27. For an analysis of the 'leading inputs' and its application to Asian agriculture see Ishikawa, op.cit., pp.84-7.
28. The storage capacity of the Aswan Reservoir increased from 1,000m. tons of water in 1902 to 2,300m. tons in 1912. H. Serry, Irrigation in Egypt: A Brief Résumé of its History and Development, Cairo 1937.

Meanwhile, a start was also made to remedy the problem of drainage. In 1913 work began on two major projects to provide pump drainage for the North Delta by installing two pumping stations one at Mex and the other at Baltim.[29] The outbreak of the war in 1914, however, made it necessary to suspend operations and it was not until the late 1920's that work was resumed on these projects.

Suspension of investment projects, especially those connected with drainage, can only partially explain the negative rate of growth of C.S. during the War. [Table 4.1] Other important factors must have been; First, the difficulty of importing machinery [the value of imported agricultural machinery, at current prices, declined from L.E.319 thousands in 1914 to L.E. 32 thousands in 1918[30]], and second, the war effort proved to be a great drain on agricultural resources as the fellaheen as well as their animals were recruited into the Egyptian Labour Corps. [The value of NFCSin livestock decreased from L.E.24.1m.in 1908 to L.E. 15.7m. in 1918[31]] These and many other factors, especially the decrease in imports of chemical fertilizers,[32] account for the poor performance of Egyptian agriculture during the war as the average annual rate of growth of output declined from 6.8% between 1905/9-1910/14, to -2.8% between 1910/14-1915/19.[33]

Signs of slow recovery in investment activities started to show with the return of peace. The annual average rate of growth

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29. See also Chapter 2, p. 34

30. Appendix Table A-9 p. 279

31. This decline was due partly to increased demand on meat and burden animals by the Allied Army, and partly due to the animal plague which swept the Egyptian countryside before and during the war years.

32. Imports of chemical fertilizers dwindled from 73,000 tons in 1914 to 37,000 in 1917, Table A-11 p. 281

33. O'Brien in Holt, op.cit., Table 10, p.188, and Table 4-3 above.

of C.S. which declined to -0.5% during the war years (1914-16), amounted to 2.3% in 1920 [Table 4.17, as modest attempts were made to prevent a further decline in productivity. However, it was not until the mid 1920's that major projects could be resumed.

4.2.3: 1920-1939:

The inter-war period, taken as a whole, represents an investment spurt in Egyptian agriculture. Annual additions to capital stock amounted to L.E.12.5m. on average, which is more than double the prewar level and six times that of the war years. Consequently, the average annual rate of growth of capital stock, which dropped from 3.01% in 1882-1907 to only 1.08% in 1907-20, rose to 3.63% during the period 1920-39. [Table 4.27

This impressive performance was mainly a manifestation of renewed investment by the government in a new phase of development of the country's hydraulic system. The deterioration in agricultural productivity which reached alarming proportions during the War had to be reversed or at least checked. As the War drew to a close, big irrigation plans were prepared. The intense demand for cotton and the high prices made an extension of the summer area all the more desirable. This implied work in three directions, (i) an examination of the whole course of the Nile and further irrigation projects on the upper reaches of the river, (ii) the extension of perennial irrigation to the whole country, and (iii) the introduction of an adequate system of drainage for the whole country.[34]

However, in view of the immediate post-war conditions, it proved difficult to embark on such schemes. The 1919 Revolution created a state of political instability from which the country did not recover until legal independence was granted (1922), and the

34. Crouchley, op.cit., p.219.

constitution promulgated (1923). Moreover, the inflationary process created by the war soon gave way to a succession of deflationary waves (in 1921 and 1926) which culminated ultimately in the Great Slump of 1929-31[35]. Under such circumstances the government found it difficult to undertake any project which involved substantial investment and limited its efforts to simple reconstruction tasks to make good the war-time wear and tear. These factors account for the low level of investment and erratic movement of C.F. between 1920 and 1927. Table 4.1 shows that, as a result of the two depressions of 1921 and 1926, the average annual rate of growth of C.S. in Egyptian agriculture dropped from 3.2% to -1.3% between 1921 and 1922 and from 2.8% to 1.7% between 1926 and 1927. Moreover, the average level of annual investment between 1920 and 1927 amounted to L.E.4.3m. as compared with L.E. 12.5m. for the interwar period as a whole.

But this slow and uneven growth of C.S. was soon to develop into a sustained upswing as the government made a serious attempt, by 1927, to carry out the overdue drainage projects. The task involved the provision of a wide network of drainage channels connecting the main drains to individual fields, and the installation of a number of pumping stations to lift the water from the terminal ends of the canals and pump it into the Mediterranean or the northern lakes.[36] By 1939 about 10 thousand kilometers of drains, and at least 18 electrically-operated pumping stations provided drainage facilities for almost two-thirds (2.2m. feddans) of the cultivated area in the Delta.[37]

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35. For a detailed description of the interwar conditions and the effect of international depressions on the Egyptian economy see: Crouchley, op.cit., pp.210-19 and National Bank of Egypt, 1898-1948, op.cit., pp.48-64.

36. See chapter 2, pp. 34-5

37. H.K. Selim, Twenty years of Agricultural Development in Egypt (1919-39), Cairo 1940, p.56.

At the same time new efforts were made to increase the supply of summer water. The second heightening of the Aswan Dam (1933-35), and the construction of the Gebel el Aulya Dam (1937) assured Egypt of an adequate supply of water for its immediate needs. Moreover, the building of Nag Hamadi Barrage (1928) and the reconstruction of the Assiut Barrage (1934-38) made possible the conversion of Middle Egypt and parts of Upper Egypt, to perennial irrigation. Finally, Mohamed Ali Barrage was built at the head of the Delta (1934-39) to replace the ageing Delta Barrage and, thereby insuring Lower Egypt of a regular supply of summer water.[38]

The magnitude of these works is indicated by the increase in average annual expenditure on irrigation and drainage works from L.E.1.8m. in 1920-27 to L.E.14.6 during the period 1927-39, and the consequent acceleration of the average annual rate of growth of C.S. in agriculture from 1.5% to 4.4 during the same period. [Table 4.1]

Such a high rate of growth of C.S. took place at a time when the country was suffering from the devastating effects of the Great Depression of 1929-31. The catastrophic fall in the price of cotton resulted in a state of general recess. "Agriculturalists who had been obliged to raise capital on long-term mortgages, for the purchase or improvement and irrigation of land, found that the payment of annuities to the mortgage banks and institutions could not be effected except with the utmost difficulty, and expropriations on a large scale appeared probable".[39] The notorious indebtedness of the Egyptian fellah reached unprecedented levels and many small peasants found it difficult to meet the cost of production and eventually lost their land. Violent labour disputes followed the

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38. Ibid., and chapter 2, pp. 30-4
39. National Bank of Egypt, 1898, op.cit., p.58.

perpetual reduction in wages and increase in unemployment.[40] Successive governments [and there were four of them in 1929-30] were pressured into action. They first began to interfere on a limited scale by acting as a buyer for the cotton crop, granting loans to businessmen, and establishing, in 1931, the Banque de Crédit Agricole to provide credit for small cultivators. It should be pointed out, however, that small cultivators hardly benefitted from these facilities as in most cases the big landlords got hold of the money and relent it at excessive interest rates. Moreover, encouraged by the extremely low cost of labour due to falling wages, and in an attempt to create employment opportunities for the idle worker, the government had recourse to investment in those public works projects which were long overdue and badly needed to maintain production.[41] By the end of 1933 there were signs that Egypt was recovering from the slump. Steadily increasing demand for cotton and rising prices enabled the government to intensify its investment in those works of irrigation and drainage which characterised the 1930's.

The completion of these schemes was accompanied by a commendable though less impressive than in the 19th century, growth of agricultural production. During the interwar period, agricultural output increased by 35% which suggests an annual average rate of growth of 1.5%[42]. Evidence seems to suggest that expansion of

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40. For a detailed and vivid account of labour conditions during the Depression see Amin Ezz el-Din, The History of the Egyptian Working Class in the Thirties; 1929-1939, Cairo 1972 (Arabic).

41. Ibid. Agriculture wage index (1914=100) shows the decline in wages during the Depression as follows:

1920	1928	1929	1933	1934	1939	1941	1945
258	161	117	85	58	96	115	200

B. Hansen, "Marginal Productivity Wage Theory and Subsistence Wage Theory in Egyptian Agriculture", Journal of Development Studies, Vol. 2, No. 4, July 1966, Table III, p.405.

42. O'Brien, in Holt, op.cit., p.188.

cultivated areas, which was the prime source of growth in the past, assumed less importnce than the increase in productivity in explaining this rise in output. Between 1920 and 1939, cultivated and cropped areas increased by 1% and 9% respectively, which corresponds to respective annual average rates of growth of 0.05% and 0.43%[43]. On the other hand, the increase in productivity as measured by physical yields of different crops was much more spectacular. Between 1920-4 and 1935-9, average yields per feddan increased by 42% for cotton, 29% for barley, 26%for rice, 23% for wheat, and 12% for sugar, maize and beans.[44] Increased supply of summer water and better drainage must have contributed to this improvement in productivity. More important, however, was the intensive application of chemical fertilisers[45], wider use of selected seeds, employment of more scientific methods of cultivation, and, to a limited degree, the use of machinery.[46] The implications of this pattern of investment are clear. The minor expansion of cultivated and cropped areas in response to investment in irrigation projects meant that Egypt had exhausted the obvious possibilities to increase the supply of land and any further additions to that scarce factor would have required a huge investment in projects like the High Dam. The shift of stress in investment to drainage projects reflected the necessity to repair the damage done to soil fertility during the years of expansion. Moreover, modern inputs that embody technical progress, especially fertilisers, became conditional for any further increase in agricultural productivity. Their importance

43. Appendix Table A-10

44. Appendix Table A-12

45. Between 1922 and 1939, total supply of chemical fertilisers increased from 118,000 tons to 485,000 tons, and fertiliser input increased from 22.1 to 90.9 kg. and from 14.4 to 56.9 kg. per feddan of cultivated and cropped areas respectively, Appendix Table A-11

46. The value of imported agricultural machinery, at 1960 prices, increased from L.E. 594,000 in 1920 to L.E. 1,035,000 in 1939, i.e., by 174%, Table 2-5.

was brought into focus during the Second World War when the difficulty of importing fertilisers resulted in a serious decline in agricultural productivity.

4.2.4: 1939-1952:

The Second World War interrupted the expansion which Egyptian agriculture had enjoyed during the 1920's and 1930's. During the war years (1940-4), agricultural output was 14.4% lower than in 1935-9, and it was not until the mid-1950's that it regained its pre-war level.[47] Moreover, there was a sharp downswing in capital accumulation as the average annual rate of growth of C.S. fell from 5.1% in 1935-9 to 1.9% in 1940-4, and, with the exception of a short upswing in thepost war years, the pre-war growth rate was not attained until the 1960's. [Table 4-37]

Various factors must have contributed to this slackening of agricultural growth. To start with, the dislocation of international trade and the disruption of navigation in the Mediterranean made it difficult for Egypt to dispose of her principal export, cotton, and to import her needs of consumer and capital goods.[48] The situation was aggravated by the fact that the war caught Egypt totally unprepared as she failed to join the active policy of 'stock-piling' pursued by many countries in anticipation of war. Shortage of machinery, spare-parts, fertilisers, and, above all, food, proved to be a tremendous strain on an economy heavily dependent on the outside world for obtaining such vital commodities.[49] One of the serious aspects of this situation was

47. O'Brien in Holt, op.cit., p.188.

48. National Bank of Egypt, 1898-1948, op.cit., pp.65-7.

49. Ragaei W. El-Mallakh, The Effects of the Second World War on the Economic Development of Egypt, Unpublished Ph.D. Thesis, Rutgers University, The State University of New Jersey, May 1955, pp.53-4.

the drastic reduction in the supply of chemical fertilisers. From an average of about 106 Kg. per feddan of cultivated area, and 68 Kg. of cropped area in 1935-9, fertiliser inputs narrowed down to only 39.5 Kg. and 24 Kg. respectively during the war years, 1940-4 [Appendix Table A-11, p.281] Similarly, the value of imported machinery (at 1960 prices) declined from L.E.1.1m. to L.E.0.6m. during the same period as Egypt was cut off from its traditional supply sources in England.[50] Moreover, as in the Great War, agricultural resources, especially labour and draft animals, were heavily drawn upon by the Middle East Supply Centre to support the Allied military effort. The Egyptian Army increased from 22,000 in 1937-8 to 45,000 in 1945[51], and C.S. in livestock declined by 5.1% between 1939 and 1942 and only regained its prewar level in 1945 [Table 4-1]. The shortage of these vital inputs largely explains the serious decline in agricultural productivity during the war. Measured in terms of average physical yeilds per feddan, the decline in productivity, between 1939 and 1945, amounted to 28% for what, 24% for barley and onions, 20% for rice, 9% for maize, and 0.7% for cotton [Appendix Table A-12]

Another adverse effect of the war was the disruption of public investment in the country's hydraulic system, particularly the important drainage projects launched in the late 1920's and 1930's. Preoccupied with such short-term problems as the stabilisation of cotton trade and provision of food supplies, the Government neither had the desire nor the resources to embark on new projects that require sizeable investment.[52] Table 4-1 shows

50. Table 2-5.

51. A.R. Prest, War Economies of Primary Producing Countries, Cambridge University Press 1948, p.126.

52. For an exposition of the War's impact on Egyptian agriculture and the Government's policies see; J. Anhoury, Les Repercussions de la Guerre sur L'Agriculture Egyptienne, L'Egypte Contemporaine March-April 1947, and El-Mallakh, op.cit., pp.51-83.

how C.F. in irrigation and drainage which amounted to L.E.16.7m. on average per year in 1935-9, declined to only L.E.3.7m. in 1940-4. This failure to maintain investment in the most important component of fixed C.F. (about 70% of total C.S.), provides the major explanation for the downswing in agricultural investment during the war years.

Recovery from the effects of the Second World War was even more protracted than from the first, for it was not until the 1960's that the pre-war growth rate of C.S. was regained. Table 4-1 shows that after a short-lived recovery in 1946-8, C.F. decreased to levels even lower than during the war. This could be explained by reference to the investment behaviour of both Government and landowners in the post-war period. Once the war was over, the immediate problem was to remedy the exhaustion of the soil and the consequent deterioration of yields. Inputs of fertilisers, from resumed imports and the newly-started local production, were intensified and the pre-war levels of productivity regained.[53] Moreover, the pent-up demand of landowners found satisfaction, besides buying land and real estate, in replenishing their acquisition of livestock and, to a limited extent, in buying farm machines and implements. This wave of investment, however, was soon to recede due to the drain on livestock which farmers found more profitable, under the conditions of rapidly rising prices, to sell as meat.[54]

The Government's efforts, on the other hand, were limited to replacement works, such as the reconstruction of the Esna Barrage (1946-48), and with the exception of Edfina Barrage (1947-51) no

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53. Inputs of fertilisers per feddan of cultivated and cropped areas increased from 39.5 Kg. and 24 Kg. respectively in 1940-4 to 80 Kg. and 46 Kg. in 1945-9, and to 145 Kg. and 89 Kg. in 1950-2 (Table A-11).

54. The effect of the post-war bent-up demand is obviously reflected in the jump in c.f. in livestock from about L.E. 1.2m. during the war to L.E.12.4m. in 1946-7. Then the decline during 1949-52 indicates the effect of the drain on livestock sold for meat consumption (Table 4-1).

major irrigation projects were launched until the late 1950's.[55] The development of Egypt's hydraulic system has reached a stage where any further progress would have required massive investments in big projects. Egyptian agriculture already stood very close to the margin of intensive cultivation. Any further expansion of cultivated land depended on increased water supply. A long-term storage project was essential to save the flood water from being lost to the Mediterranean every year, and to avoid the harmful effects of fluctuations in the annual water discharge at Aswan.[56] Moreover, the problem of rising sub-soil water-table, which resulted from decades of perennial irrigation and was adversely affecting the fertility of soil and productivity of crops, was pressing for a solution. Plans for a drainage network and pumping stations operated by electricity to be generated from a hydraulic power station, at the Aswan Dam, had been on the Government's agenda since the 1930's.

Under conditions of extreme political instability and disturbed state finances,[57] the Government was incapable of undertaking such long-term projects, and it was not until a new regime came to power that an attempt was made to carry them out.

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55. Central Bank of Egypt Economic Review, Post-war Agricultural Developments in the Egyptian Region, Vol. I, No. 2, 1961, p.207.

56. H.E. Hurst, The Nile, London 1952, pp.310-18.

57. The Government was preoccupied by short-term policies to combat post-war inflation, and its ability to carry out long-term investment projects was greatly reduced by its inability to use the accumulated sterling balances in importing investment goods due to Britain's reluctance to repay at all, or at most to pay allotments too small to allow any sizeable investment. See B.D. Weinryb, Industrial Development in the Near East, Quarterly Journal of Economics, Vol. 61, May 1947, p.496.

4.2.5 1952-67:

This period represents the third and final investment spurt or upswing in Egyptian agriculture. The average annual rate of growth of C.S., which amounted only to 0.88% during the period of stagnation connected with the War and its aftermath, rose to 3.8% in 1952-67, the highest rate of growth achieved during the eighty-five years under review [Table 4.1] Parallel to this development working capital, represented by the use of fertilisers, increased by 126%, which suggests an average annual rate of growth of 5.23% as compared with only 2% for total agricultural output [Appendix Table A-1].

The accelerated growth of C.S. during this period was closely associated with the fundamental changes in policies, institutions, and attitudes brought about by the 1952 Revolution. Though the new régime favoured industrialisation as the instrument of rapid growth and modernisation, agriculture was not neglected. According to the Ministry of planning, the share of agricultural investment in total capital expenditure increased from 11.6% in 1952-3 to 16.8% in 1967-8. Despite the relative decline in its share in G.D.P. during this period, agriculture continued to be the most important sector of the economy contributing about 30% of G.D.P. and employing more than 50% of the total labour force.[58]

The government's agrarian policy consisted of two sets of measures; First, the improvement of the organisational structure of Egyptian agriculture through land reform and other institutional changes. Though these measures were not directly related to capital formation, they had significant implications as they provided an important instrument for transmitting other government policies into rural Egypt. Secondly, a massive investment

58. Ministry of Planning, Indicators of Economic Development from the Beginning of the Revolution to the End of the First Five-Year Plan, Cairo 1966, and Follow-up and Appraisal of Economic Growth in the U.A.R., Cairo (annual since 1966/7).

programme which included, a) 'Horizontal expansion', or addition to cultivated area through investment in irrigation and land reclamation, b) 'Vertical expansion', i.e., the institution of measures to increase the productivity of land already under cultivation through better irrigation and drainage and greater use of fertilisers, as well as the initiation of measures to improve seeds and methods of pest control, research, credit, marketing facilities, and development of agricultural education, and c) Allocation of sizeable investment (33% of total agricultural investment in 1959/60-67/68) for building the High Dam thereby solving the problem of long-term water storage upon which the success of both horizontal and vertical expansion greatly depended.[59]

Land reform was the first major policy measure of the new régime. Land in excess of 100 feddans possessed by an individual was expropriated and redistributed to landless tenant farmers in plots of 2-5 feddans. 754,487 feddans (only 11.5% of total cultivated area) were distributed among 317,376 families comprising about 1.6 million people.[60]

Though the reform aimed in the first place at weakening the traditional and institutional power of landlords, it also sought to change the defective land tenure system characterised by absentee landlordism and conducive to inefficiency.[61] Tenancy was regulated

59. For a detailed account of government policies during this period see; Egypt, The Permanent Council for the Development of National Production, 1955, Cairo 1955, pp.24-173, and U.A.R., Ministry of Agrarian Reform and Land Reclamation, Agrarian Reform and Land Reclamation, 1952-1963, Cairo 1963.

60. C.A.P.M.S., Statistical Indicators of the U.A.R., 1952-1967, Cairo 1968, p.139.

61. The reasons could be summarised as follows; i) the greater proportion of land (55%) owned mostly by absentee landlords, was cultivated by tenants who had little incentive to increase productivity by investment. Rents frequently attained levels well above net annual returns, and shortly insecure leases resulted in tenants seeking quick returns with no regard for the fertility of the soil, and ii) the high preference of tenure

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by fixing a ceiling on rental values much lower than existing previously. The minimum wage for hired farm labourers was fixed at 18 piasters per day per man, and later increased to 25 piasters. These rates had scarcely been effective at the beginning due to abundance of farm labour and the seasonal nature of demand for labour. Only recently, as a result of the increase in Public works, industrialisation and the increase in demand for labour by the public sector that these wages have reached and in some cases exceeded the minimum level. A wide network of cooperatives [4921 societies with 2.8m. members and L.E.2.8m. capital in 1967] provided the farmers with machinery, livestock fertilisers, and seeds; and through it they were able to market their crops and obtain credit. To overcome the shortcomings created by the inevitable fragmentation of land, a system of grouping of land use was introduced first in land reform areas, then extended to the whole country.[62]

The impact of these institutional changes on the rate of agricultural capital formation appears to be significant. First the reduction of rents (from L.E.35 to 20 per feddan) which affected 55% of the total cultivated land, and amounted frequently to half the total cost of production, enabled tenants to increase their investment in livestock, implements and, above all, fertilisers.[63] Secondly, one of the distinguishing features of Egyptian agrarian reform was the fact that it was a part of a more

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...../groups to own land led to most agricultural savings being used to gain more control of land with little increase in investment to improve the productivity of land. See, M.R. El-Ghonemy, Resource Use and Income in Egyptian Agriculture before and after the Land Reform with particular Reference to Economic Development, unpublished Ph.D. Thesis, North Carolina State University, Raleigh, U.S.A. 1954.

62. Sayed Marei, Egyptian Agrarian Reform, Cairo 1957.

63. Doreen Wariner, Land Reform and Development in the Middle East; of Egypt, Syria and Iraq, London 1957, pp.40-41.

comprehensive programme of agricultural development rather than a simple redistribution of land. A new industrial set up was created that provided the government with a wide organisational network through which it could affect investment and production. In fact the success of the policy of 'vertical development' was mainly due to the facility by which the government was able to channel supplies of chemical fertilisers, new breeds of livestock, farm machinery, cheap credit, improved seeds, efficient methods of pest control, and technical advice into rural Egypt[64].

Between 1952 and 1967, the total supply of chemical fertilisers increased by 126%, and fertiliser inputs per feddan of cultivated and cropped areas more than doubled [Appendix A-11]. The value of agricultural machinery, mainly for ploughing and land reclamation, not only increased by 97%, but its share in total NFCS also rose from 4.7% to 5.2% during the same period. Livestock increased by a lower, though impressive rate of 35%. The magnitude of these developments is indicated by the rise in farm capital intensity (i.e. value of fixed capital stock, excluding irrigation, per feddan of cultivated area) from L.E. 25.6 in 1952 to L.E. 33.5 in 1967 [Table 4.6].

Investment in drainage was also instrumental in the policy of 'vertical expansion'. The chronic problem of subsoil water logging, which had received no serious attention since the 1930's was adversely affecting crop productivity. Open drains, hitherto used, were inefficient, difficult to maintain and also resulted in the loss of 10-15% of scarce land[65]. Substantial investments, therefore, were allocated, especially under the 5-year plan of 1959/60-64/65, to the project of tile, or covered, drainage which

64. M. Riad El-Ghonemy, "Economic and Institutional Organisation of Egyptian Agriculture Since 1952", in P.J. Vatikiotis (ed.) Egypt Since the Revolution, London 1968, pp.77-8.

65. Charles Issawi, Egypt in Revolution, An Economic Analysis, London 1963, p.128.

the government estimated to increase crop-yields by 25%[66].

Furthermore, the government's investment policy was firmly focussed on 'horizontal expansion', i.e. additions along the extensive margin.[67] It was apparent that any further increase in the supply of land depended on the availability of additional water. Between 1935 (the 2nd heightening of Aswan Dam) and 1965 (the end of the 1st stage of the High Dam), the supply of water from the Nile remained fixed at the storage capacity of the Aswan Reservoir. The objective of the government's irrigation policy was first to insure a more economic utilisation of water both for extending cultivation and for bringing about shifts in the crop pattern. An ambitious programme of land reclamation launched by the mid-1950's, provided plans for the irrigation of about half a million feddans of swamp and desert land in areas such as Fayoum, Behera, East of Suez, Tahrir Province and the New Valley.[68] The area of land reclaimed between 1952 and 1967 amounted to 818,200 feddans or about 12.7% of total cultivated area. The rate of reclamation was stepped up considerably during the First Plan (1959/60-64/65) when 536,000 feddans were reclaimed as compared with 78,800 feedans in the year 1952-1960. This rate was reduced in the post-plan period (only 203 feddans in 1965/6-67/8) as more adequate considerations were given to reclamation costs.[69] Reclaimed land does not represent, however, actual additions to cultivated

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66. Ibid., pp.128-9. By the end of the plan an area of 250,000 feddans were covered with tile drains at a cost of £67.8m.

67. Under the 1960-65 plan, horizontal expansion was to absorb 68.8% of total agricultural investment, leaving 31.2% for vertical expansion; A.L. El-Baghdadi, The Five Year Plan for Economic and Social Development of the U.A.R., 1960-65, Cairo 1960, pp.33-34.

68. The Permanent Council for the Development of National Production, op.cit., pp.65, 91.

69. C.A.P.M.S., Annual Bulletin of Land Reclamation, Ref. No. 03-415, Cairo, annual since 1964-5.

area. A gestation period of at least 5 years should be allowed before reclaimed land begins to give yields equivalent to marginal land. In fact actual additions to the cultivated area during this period amounted only to 490,000 feddansor 60% of the reclaimed area.[70] Meanwhile the conversion to perennial irrigation of the million feddans under basin irrigation in upper Egypt, and the important shifts in the crop-pattern favouring more valuable crops (rice, vegetables and fruits) which stay in the field for a relatively shorter period than traditional crops, led to an increase of the cropped area by 13% during this period. [Appendix A-12 Table 7]

These improvements in irrigation efficiency cannot, however, extend cultivation and cropping beyond a certain limit. By the late 1950's this limit may be said to have been reached. Any further expansion or attempt to push away the margin of diminishing returns would now require large investment in gigantic projects. Thus the government's agricultural policy during the 1960's evolved around the building of the High Dam which solves the long term storage problem. Completed in 1970, the cost of the Dam amounted to more than L.E.600m. about one third of which was financed by a loan from the U.S.S.R. The benefits of the project are estimated as the extension of the cultivated area by 1.3m. feddans, the conversion of 700,000 feddans to perennial irrigation, flood protection, the lowering of the water table and consequent raising of crop productivity, and the generation of 6-9 billion Kwh. of electric power annually.[71] It is of course too early to establish whether enough benefits have resulted from the High Dam tojustify its huge cost. However, The Ministry of Agriculture has estimated

70. C.A.P.M.S., Annual Bulletin of Cultivable Land, Ref. No. 03-415, Cairo, annual since 1965/6.

71. Ministry of Public Works, The New Agricultural Expansion on the High Dam water, Cairo, Government Press 1963; and Ministry of the High Dam, The High Dam Project, Cairo, Government Press 1967.

the benefits generated between 1964-1970 at L.E.479m. at 1960 prices[72]. Moreover, a recent cost-benefit study concludes that "The High Dam Project, even at high discount rates, yields positive present values and a benefit/cost ratio exceeding unity. Further, its internal rate of return is greater than the appropriate rate of interest applied"[73]. Nevertheless, the final judgement on the profitability or otherwise of such an indivisible and multi-purpose project like the High Dam depends on the execution of a large number of complementary projects to benefit from external economies created by the original investment, a task which falls beyond the horizon of the present study.

4.3 The Structure of Capital Formation in Egyptian Agriculture:

Having examined the long-term growth pattern of C.F. in agriculture, we now turn to a study of the changes in the composition of C.S. over the period under review. The main features are readily apparent in Table 4.4; a remarkable and almost continuous increase in the share of 'Irrigation and Drainage', the increase in the small share of 'Machinery', which began to take place particularly after World War II, and concomitant decrease in the share of 'Livestock' and 'Dwellings and Farm Buildings' from 1900 onwards [Chart 4-3].

72. Yusuf A. Shibl, The Aswan High Dam, The Arab Institute for Research and Publishing, Beirut, 1971, p.114.

73. Ibid., p.127.

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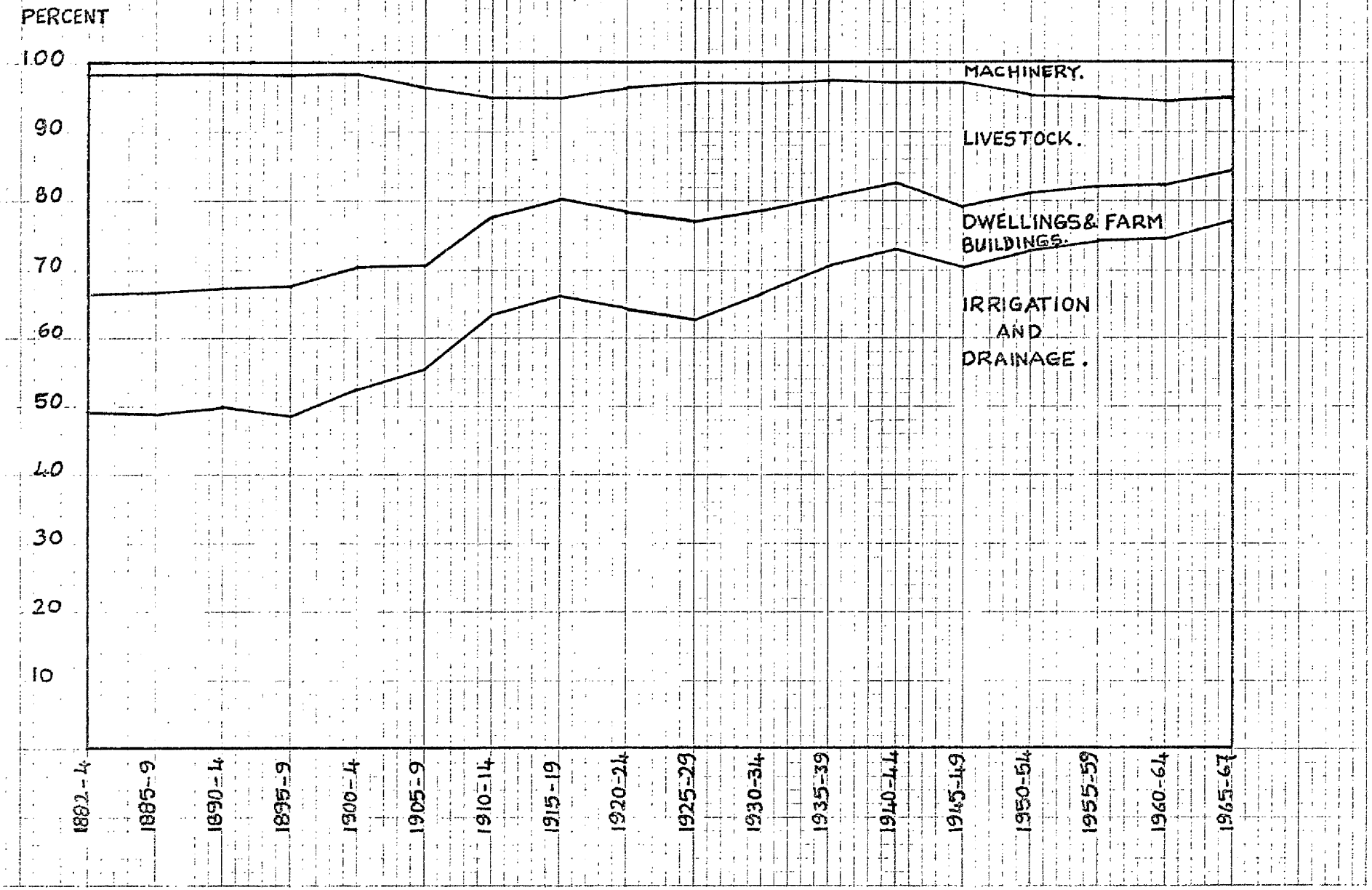
Table 4-4

Structure of Fixed Capital in Egyptian Agriculture
By Type of Capital Goods %

Years	Irrigation & Drainage	Building & Constr.	Live-stock	Machinery, Tools & Implements	Total
1882-4	49.7	16.7	32.1	1.5	100
1885-9	49.3	17.3	31.9	1.5	100
1890-4	50.0	17.5	30.9	1.6	100
1895-9	48.7	18.9	30.8	1.6	100
1900-4	52.6	17.8	28.2	1.4	100
1905-9	55.7	14.8	25.6	3.9	100
1910-14	63.6	14.1	17.2	5.1	100
1915-19	66.1	14.1	14.8	5.0	100
1920-24	64.1	14.2	18.1	3.6	100
1925-29	62.8	14.1	20.0	3.1	100
1930-34	66.2	12.2	18.8	2.8	100
1935-39	70.4	10.2	16.9	2.5	100
1940-44	73.2	9.3	15.1	2.4	100
1945-49	70.5	8.6	18.3	2.6	100
1950-54	73.3	8.4	13.9	4.4	100
1955-59	74.2	7.8	12.9	5.1	100
1960-64	74.5	7.7	12.3	5.5	100
1965-67	76.8	7.7	10.2	5.3	100

Source: Five-year averages calculated from annual figures in Table 4-1.

CHART 4-3 : STRUCTURE OF AGRICULTURAL FIXED CAPITAL STOCK.



It appears that C.F. in Egyptian agriculture throughout the period has essentially involved the building and development of the hydraulic system. As early as 1882, net Capital Stock in 'Irrigation and Drainage' (at 1960 prices) amounted to about half the net Capital Stock in total agriculture. This share has since increased rapidly, especially during the periods 1900-19, 1930-44, and 1955-67. Large investments in the hydraulic system have not always been the only cause of the increase in the share of irrigation recorded here. Thus an increase between 1915-19 and 1940-44 were simply due to the decline in livestock caused by disruptions of the two World Wars. Irrigation represents now some 77% of total C.S., i.e., its share has increased by more than one and a half times. Agricultural development has been characterised by increased supply and improved distribution of water rather than by mechanisation or expansion of the livestock.

The small share of 'Machinery' represents mainly investment by the Fellah in the set of traditional equipment such as the 'sakia', 'shadouf', 'nourag', spade and native plough, most of which date back to time immemorial. Modern machinery, mainly pumps and ploughs, were used since before the First World War on a very limited scale on big farms and government domains[74]. There seems to have been a modest increase in mechanisation during the interwar period, but the share of this category remained very low fluctuating around an average of 3%. The increases which took place after World War II and which raised this share to the level of 5.3% by the end of the period, may seem very significant when compared with earlier developments. This does not necessarily imply a considerable increase in farm capital intensity as they reflect large purchase by government of tractors and other machines for the purpose of land reclamation.

Livestock is second in importance to irrigation among the

74. E.R.J. Owen, Cotton in the Egyptian Economy, op. cit., p.258.

components of C.S. Although it accounted for the second largest share throughout the period, its relative share began to decline rapidly since 1909. While the average annual rate of growth of NFCS in irrigation was 3.2% during the whole period, that of livestock amounted only to 1.34%. These comparisons however should not suggest that the increase in animal wealth was of minor significance; the value of livestock per unit of cultivated area has in fact increased more than two-and-a-half times during the period. Livestock fulfills many functions to the fellah as a substitute for machinery in agricultural work, a means of transport for both people and goods and the source of a wide range of meat and dairy products.

Another way of assessing the relative importance of irrigation on one hand and farm capital on the other, is to compare the evolution of capital-output ratios in Egyptian agriculture. This is shown in Table 4.5 where we computed three ratios; total fixed capital/output, irrigation/output, and farm capital/output. While the second increased by 288% between 1895 and 1962, the third increased by only 28%. The remarkable contrast between these two ratios points to two of the most important aspects of agricultural development in Egypt during this period: (a) a notable and continuous rise in the cost (represented by investment in irrigation) of increasing the cultivable area, and (b) the apparent lack of technical progress implied by the pronounced sluggishness of investment in farm capital.

Table 4-5

Average Capital-Output Ratio in Egyptian Agriculture, Indices, 1895-99=100

Years	Total NFCS (1)	NFCS in Irrigation (2)	NFCS in Farm Capital (3)	Indices of Capital-Output Ratios (1)/ output	(2)/ output	(3)/ output
1895-9	100	100	100	100	100	100
1900-4	120	130	111	109	118	101
1905-9	160	183	139	138	158	120
1910-14	176	230	125	145	190	103
1915-19	181	245	119	176	238	116
1920-24	194	255	136	172	226	120
1925-29	213	274	154	160	206	116
1930-34	267	363	176	198	269	130
1935-39	343	496	198	224	324	129
1940-44	377	567	197	288	433	150
1945-49	410	594	236	293	424	169
1950-54	420	633	219	280	422	146
1955-59	463	706	233	252	384	127
1960-62	519	791	262	254	388	128

Source: To obtain the above capital-output ratios all capital indices are divided by O'Brien's index of agricultural output presented in Table 4-3 above. Indices (1), (2) and (3) are based on 5-year averages calculated from Table 4-1. Farm capital means all fixed capital stock excluding irrigation.

The pattern of C.F. reflects the limiting influence on Egyptian agriculture of the scarcity of arable land. This explains the attempt to supplement the shortage of land by multiple-cropping and hence the necessity of providing water throughout the year. It also explains the low rate of growth of livestock which, in the absence of natural pastures competes because of fodder, with plant production in the allocation of scarce land. In fact livestock can be seen as a complement to cotton because of the complementarity of cotton and clover in the agricultural rotation.[75] The shortage of land is not unrelated to the low rate of accumulation in dwellings and machinery. There is little incentive to mechanise when labour is abundant relatively to other factors of production. Similarly the poverty of the rural population, itself partly a consequence of unfavourable factor proportions, is not conducive to high rates of C.F. in dwellings and farm buildings.[76]

Another characteristic of this pattern which arises from the dominant place of irrigation is the significant role of public investment. Because of their scale and the nature of the hydraulic system in Egypt which relies almost exclusively on a single source, the Nile, irrigation works are necessarily the responsibility of the government. When the main source of water is, say, the underground water table the private sector may become responsible for securing its own supplies by drilling wells and other on-farm means. In Egypt, however, irrigation implies the provision of central facilities for the storage of water and an integrated network of canals and main drains for its distribution and discharge. All this falls beyond the means and outside the scope of the private sector whose responsibility is limited to digging

75. B. Hansen and G. Marzouk, Development and Economic Policy in the U.A.R. (Egypt), Amsterdam 1965, pp.66-7.

76. G. Saab, Motorisation de l'Agriculture et Developpement Agricole en Proche-Orient, Paris 1960.

small conduits on the farm. The other components of C.S., building, livestock, tools and machinery, belong in the main to the private sector. The period has therefore witnessed an evolution of the relative role of the government and the individual farmers. At the beginning of the period almost half the C.S. was composed of non-irrigation items and hence largely in the hands of famers. The considerable development of irrigation which involved the government throughout the period reduced this proportion; in 1967, 77% of C.S. were publicly owned. Put differently, while the average annual rate of growth of public component of C.S. was equal to 3.2% during the period, that of the private component was only about 1.8%[77].

Assuming that the ratio of private capital to value added in Egyptian agriculture is in the order of 0.9[78], and that the rate of depreciation is some 10%[79] we may infer that gross private investment is equivalent to about 12% of agricultural income. This is by no means a low rate in a poor agriculture considering the prevalence of very small farm holdings, the insecurity of tenure which for a long time characterised the agrarian system, the poverty and the chronic indebtedness of the Egyptian fellah. Our capital formation series reveals the

77. It is assumed here that irrigation and drainage constitute the public component, while building, livestock and tools and machinery represent private investment. This may slightly overstate the share of the private sector but the effect of the bias on the relative rates of growth of C.S. is likely to be negligible.

78. In 1960 private C.S. amounted to L.E.323.1m. and value added to L.E.418.0m. out of which some L.E.360m. may be attributed to the private sector. See Table 4.1 and Egypt, Department of Statistics, National Income from Agriculture, 1958-60 Cairo 1960, p.136.

79. This is a weighted average of the rates of depreciation of different items of fixed capital as estimated by the Ministry of Agriculture and reported in Ibid., pp.17 and 186-7.

Table 4-6

Farm Capital Intensity in Egyptian Agriculture

Years	Cultivated Area	Fixed Capital Stock Excluding Irrigation			Fertilizer inputs		Fixed Capital Stock plus Fertilizers		
	000 Fedd.	Total £.E.M.	Per Fedd. £.E.	Index	Total £.E.M.	Per Fedd. £.E.	Total	Per Fedd.	Index
1885-9	4,879	54.6	11.2	100	-	-	54.6	11.2	100
1890-4	4,925	60.0	12.2	109	-	-	60.0	12.2	109
1895-9	5,028	66.5	13.2	118	-	-	66.5	13.2	118
1900-4	5,287	73.9	14.0	125	0.1	0.02	74.0	14.0	125
1905-9	5,370	92.3	17.2	154	0.6	0.11	92.9	17.3	154
1910-14	5,240	83.2	15.9	142	1.9	0.36	85.1	16.2	145
1915-19	5,278	79.4	15.0	134	1.0	0.19	80.4	15.2	136
1920-24	5,316	90.2	17.0	152	3.1	0.58	93.3	17.6	157
1925-29	5,503	102.7	18.7	167	7.2	1.31	109.9	20.0	179
1930-34	5,432	117.1	21.6	193	8.6	1.58	125.7	23.1	206
1935-39	5,304	131.4	24.8	221	14.7	2.77	146.1	27.5	246
1940-44	5,375	131.1	24.4	218	5.5	1.02	136.6	25.4	227
1945-49	5,770	156.8	27.2	243	12.0	2.08	168.8	29.3	262
1950-54	5,698	145.7	25.6	229	21.4	3.76	167.1	29.3	262
1955-59	5,769	154.8	26.8	239	28.7	4.95	183.5	31.8	284
1960-64	5,986	184.4	30.8	275	42.6	7.12	227.0	37.9	338
1965-67	6,323	211.6	33.5	299	53.6	8.48	265.2	41.9	374

Source: Figures on cultivated area and fertilizer inputs are calculated from Appendix Tables A-10 and A-11, and those on fixed capital from Table 4.1

importance of real savings which take the form of additions to livestock and building and maintenance of farm structures in poor agriculture. There is no doubt that a more favourable tenure system, better credit facilities for the poorer peasant and improved agrarian institutions would have been conducive to a higher savings rate. It is interesting to note that the annual average rate of private capital accumulation was 1.5% between 1882 and 1954 and 2.9% between 1954 and 1967 that is, after the implementation of the land reform. However, it is beyond the scope of this study to investigate further the complex relationship between institutional change and the growth of C.F. but this primary indication of a positive effect is worth observing.

The accumulation of private capital on the land is reflected in Table 4.6 where different measures of farm capital intensity are presented. Between 1885-9 and 1965-7, the index of fixed capital stock excluding irrigation per feddan of cultivated area, which can be construed as an index of farm capital intensity, increased by 199%. If fertilisers are added to give a composite measure of fixed and working capital,[80] the index increases by 274%. The continuous increase in the use of fertilisers in the second half of the period, on which we commented on several occasions, is apparent here.

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80. Lack of data on the different components of working capital forced us to take fertilisers as a proxy. Fertilisers represent however the larger part of working capital. Table 4.8 shows that it accounts for about 25% of total working capital in 1950-66.

4.4 Conclusion

The long-term growth pattern of C.F. in Egyptian agriculture suggests the alternation of long swings. Five distinctive swings in the growth of C.S. could be identified upon which we based our periodisation. The three periods; 1882-1907, 1920-39 and 1952-67, represent investment spurts or upswings, while the other two; 1907-20 and 1939-52, were periods of much slower investment growth, or downswings. It is not my intention to suggest that these were natural successions in the Kuznets cycle sense as the two downswings coincide with the two World Wars. Further investigation in the nature of these swings require the availability of long-term data on other aggregates such as the total C.F., G.D.P., Population, etc.

The development of Egyptian agriculture during the period of study may be interpreted in terms of Ishikawa's model of Asian agriculture.[81] The transition from subsistence to a market-oriented agriculture takes place through the cultivation and export of a cash crop. This in turn encourages an expansion of the cultivated area and causes significant changes in the nature and scale of agricultural investment as well as certain changes in techniques. The expansion of the cultivated area may require at first a certain amount of basic investment in irrigation. As the arable land frontier is approached, the scale of the hydraulic works required may increase considerably. At this stage, water, which is an essential complement to land since it enables arable, but as yet uncultivated, areas to be brought into production, plays the role of 'leading input'. But as gains in output become more difficult to achieve in this way, that is when the arable land frontier is reached another stage is inaugurated which involves other inputs notably fertilisers, improved seeds, better implements, drainage

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81. S. Ishikawa, Economic Development in Asian Perspective, op.cit., pp.57-83 and 84-122.

and the like, which should usually be provided as a package in adequate proportions. In Egypt, the introduction of long-staple cotton in the 1820's, before our period, precipitated the transition of a largely, but not exclusively, subsistence agriculture into an export-oriented economy. Considerable expansion of the cultivated area took place during the 19th century and this involved the extension of the network of summer-irrigation canals and the construction of the Delta Barrage. The interesting feature of Egyptian agricultural development is the successful attempt to increase the effective supply of land through multiple cropping when the expansion of cultivated area became more difficult and expensive. These developments took place mainly during our period. They were made possible in a first stage by the building of the Aswan Dam in 1902 and the complementary works which comprised the construction of three barrages besides other irrigation works. This was soon followed by the first heightening of the Aswan Dam in 1912. Water was clearly the leading input during this period.

From then on water and fertilisers will play, in both an alternating and complementary manner, the role of leading input. As E.R.J. Owen pointed out, the rapid gains in agricultural output made possible before 1914 by the extension of the irrigation system, were bought at the cost of deterioration in the quality of the soil.[82] This necessitated investment in drainage which was undertaken to some extent, in the 1930's and a continual increase in the use of chemical fertilizers.

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82. Owen in Vatikiotis, op.cit., p.65.

TABLE 4.7

SUPPLY OF CHEMICAL FERTILIZERS

Years	Total Supply of Fertilizers 000 tons	Fertilizer inputs per feddan of cultivated area kg.	Fertilizer inputs per feddan of cropped area kg.
1900-4	2.2	0.4	0.3
1905-9	23.1	4.3	3.0
1910-14	71.7	13.8	9.4
1915-19	37.0	7.0	4.8
1920-24	118.0	22.1	14.4
1925-29	276.0	49.6	32.0
1930-34	328.5	61.5	40.4
1935-39	563.6	106.3	70.2
1940-44	212.2	39.1	23.7
1945-49	461.4	79.9	50.4
1950-54	824.2	144.6	87.5
1955-59	1102.6	190.0	108.0
1960-64	1638.4	273.3	158.2
1965-67	2059.0	330.1	198.6

Source: Supply of fertilizers from Appendix Table A-11 , and cultivated and cropped areas from Table A-10.

Table 4.7, shows the evolution of the total supply of fertilizers and of the ratio of fertilizer input per unit of both cultivated and cropped area. The increased use of fertilizers, succeeded in preventing a further deterioration in yields during the 1920's and 1930's, but it is only after World War II that they contributed to an increase in land productivity. Working capital thus began to play an important role in Egyptian agriculture in the inter-war period. Although the data presented here include fertilizers only for the years before 1950, this should not suggest that other inputs such as improved seeds, pesticides and the like were less important. (Table 4.8) The lack of quantitative data before 1950 prevents us from making precise statements but there are many indications in the literature which suggest that they were introduced much earlier.[83]

83. Ibid., pp.56-7 and 59-60.

Table 4.8

Working Capital in Egyptian Agriculture
(Current Prices)

£Em.

Year	Fertilizers	Seeds	Insecticides	Fodder	Fuel	Total (1)	Value Added in Agriculture (2)	1/2
1950	18.0	14.3	0.1	61.7	4.9	99.0	369.7	26.8
1951	19.1	17.5	0.2	72.8	5.5	115.1	361.5	31.8
1952	22.9	23.4	0.1	69.9	5.8	122.1	270.0	45.2
1953	20.5	17.0	0.1	58.3	6.2	102.1	275.6	37.0
1954	19.9	15.6	0.2	56.6	6.0	98.3	308.9	31.8
1955	20.5	15.6	0.8	52.0	7.6	96.5	313.9	30.7
1956	19.5	19.6	1.0	57.4	7.2	111.9	358.2	31.2
1957	23.8	19.0	1.3	58.3	8.8	111.2	366.6	30.3
1958	23.5	19.1	1.3	60.0	10.2	114.1	369.3	30.9
1959	24.0	19.6	1.9	59.8	10.7	116.0	390.5	29.7
1960	25.3	19.5	1.8	62.8	10.0	119.4	418.0	28.6
1961	26.8	20.4	4.5	67.1	10.4	129.2	351.9	36.7
1962	26.7	21.3	4.8	69.3	10.8	132.9	425.9	31.2
1963	29.7	19.8	7.4	72.6	11.1	140.6	479.7	29.3
1964	33.9	19.4	12.1	91.7	11.7	168.8	535.6	31.5
1965	38.1	25.4	10.4	143.7	12.4	230.0	614.7	37.4
1966	42.4	29.1	12.3	168.7	11.9	264.4	678.2	39.0

Source: Egypt, Department of Statistics and Census, National Income from Agriculture, Cairo, 1950-1967. Figures on "Fodder" for the last two years, 1965 and 1966, should be taken with reservation as they show a surprising jump which can very well be due to a statistical error.

Working capital did not supplant water as a leading input during the inter-war period which witnessed the second heightening of the Aswan Dam, and the construction of other barrages with a consequent increase in cropped areas.

After World War II and until the completion of the High Dam, working capital, especially fertilizers and to a lesser extent seeds and pesticides played a leading role. To be sure, cropped area continued to increase during this period, not as a result of the provision of more water but by an increase in the cropping intensity which necessitated ever increasing use of fertilizers to compensate for the resulting exhaustion of the soil. Reallocation of land from field crops to vegetables in areas close to the main towns also resulted in an increase in the cropped area.[84]

The High Dam inaugurates a new phase in which water resumes its role as the leading factor, for among the objectives of this multi-purpose project are the expansion of both cultivated and cropped areas. But fertilizers which did not assume the complementary role towater at the time of the first Aswan Dam, save after a lag of some 20-30 years, are now considered as an essential input because of the loss of fertility that the extension of perennial irrigation and the retention of silt behind the Dam will entail. Drainage is also an integral part of the package and Egypt has recently secured a loan from the World Bank for this purpose.

Thus the particularity of the Egyptian case when compared with the Ishikawa model is the recurrence of the Ishikawa sequence 'water-fertilizer' in a variety of forms over the period of our study. Moreover, it should be clear that while the Ishikawa model provides a summary of changes in the pattern of technology, it does

84. Vegetables occupy the land for a much shorter period than the main field crops.

not explain the reasons and timing of these changes. In other words, it does not tell us why basic investment took place when it did, or why did the alternations between this type of investment and fertilizers happen at the time when they did. To answer these questions further investigation will be required to define the nature and determinants of investment decisions which falls beyond the scope of this study.

Other interesting features of agricultural development in Egypt which can be partly explained by Ishikawa's model and partly by the problems of population growth and labour absorption in agriculture can be derived from an analysis of Table 4-9. It shows the evolution of the fixed capital/labour ratio and output per worker during the period. While capital per worker increased throughout the period, save in the 1920's, output per worker declined from 1895-9 to the mid 1920's.

TABLE 4-9

CAPITAL AND OUTPUT PER WORKER IN EGYPTIAN AGRICULTURE

INDICES, 1895-9 = 100

Years	Agricultural Working Force (1)	Capital per worker (2)	Output per worker (3)
1895-9	100	100	100
1900-4	108	111	102
1905-9	118	136	98
1910-14	126	140	96
1915-19	136	133	76
1920-24	153	127	74
1925-29	169	126	79
1930-34	186	145	73
1935-39	207	167	74
1940-44	205	184	64
1945-49	204	201	69
1950-54	206	204	73
1955-59	209	222	88
1960-62	212	245	95

Sources: Indices (1) and (3) from O'Brien in Holt, op. cit., Tables 10 and 11, pp.188 and 191 respectively. Capital per worker is obtained by dividing the 5-year average index of our capital stock series presented in Table 4-3, by column (1) in this table.

and again from 1930 to 1944. The post-war increases in output per worker barely succeeded in raising the index to the 1910-14 level. It seems therefore that considerable increases in capital per worker failed to achieve an increase in average labour productivity.[85] Many causes contributed to this state of affairs. First, the failure to supplement the early irrigation works with necessary drainage facilities and other improved inputs had drastic consequences on both yields and output per head. The recovery was slow and much delayed. This instance shows the importance of Ishikawa's notion of complementarity between new inputs. Second, a considerable increase in population was absorbed in agriculture between 1895-9 and 1935-9. During this period the size of the agricultural labour force more than doubled. This, combined with the slow growth of total output during the 1920's and 1930's, adversely affected output per worker. The fall in rural incomes which continued until the end of World War II is one of the most important factors, which prompted significant migration to the towns. The agricultural labour force hardly increased between 1935-9 and 1950-54, and its rate of growth thereafter was well below the rate of natural increase. The rise in output per worker from 1945 onwards is not entirely independent of this evolution of the labour force. Third, the increase in capital per worker suggests that the cost of increments to the effective supply of land achieved by irrigation works tend to rise. In other words, the ability of Egyptian agriculture to absorb new labourers at a sustained level of income during this period required additional investment of such a magnitude that they led

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85. Output per worker index may have a downward bias due to the exclusion of animal products, vegetables and fruits. These may have grown faster than field crops especially after 1945. Further, the output per worker series should be compared with capital perworker series with a time lag. Although these qualifications may affect the quantitative comparison of the two indices, they do not change the basic trend on which our discussion is founded.

to continuous increase of the capital-labour ratio. This is consistent with Ishikawa's view about the increasing cost encountered in the extension of the arable land frontier.

In Egypt, the High Dam which comes at the end of a long chain of major irrigation works highlights the scale and lumpiness of the investment required to gain further increments of cultivated and cropped land once less expensive opportunities have been exhausted. It is evident that the High Dam brings to a close a chapter in the history of agricultural investment in Egypt which began in the 19th century with the Delta Barrage. Further developments while conditioned by the long-term effects of this monumental project may call for an agricultural revolution of a different kind.

CHAPTER FIVE

LONG TERM TRENDS IN INDUSTRIAL CAPITAL FORMATION; 1899-1967

5.1 Long Term Growth Pattern

Chart 5.1 on which we have plotted our estimate of capital stock in Egyptian industry for the period 1899-1967 provides us with a general view of the evolution of the rates of C.F. Annual figures of the rate of growth of C.S. are also given in Table 5.1. The main features of the C.S. series can be summarized as follows:

i) Comparing the end dates of our series we find that over a period of 68 years, industrial capital increased more than 15 times with an average annual rate of growth of 3.1%. We note that this average rate is significantly higher than that of the agricultural capital stock[1].

ii) But the rate of C.F. varied considerably during the period. It is possible, however, to identify phases of rapid growth separated by periods when C.F. proceeded at a slower pace, or even a negative rate. The duration of these alternating phases suggests the existence of long swings of the Kuznets type already recognised in agriculture.

Chart 5.1 shows that three periods, namely: 1899-1907, 1920-39 and 1945-67 represent upswings. The average annual rates of growth in these three investment spurts differed from each other. These rates were 6.21%, 3.92% and 5.29% respectively. The intervening downswings in the periods 1907-20 and 1939-45 witnessed average annual rates of growth of -0.74% and -3.7%. The three spurts display very different characteristics as regards duration and amplitude. The first appears to be a short pronounced upswing but

1. Compare with Table 4-1, pp.118-20 above.

Table 5-1

The Growth of Capital Stock in Egyptian Industry

Year	NFCS	Annual Rate of Growth %	Year	NFCS	Annual Rate of Growth %
1899	89.0	-	1934	242.3	2.4
1900	94.1	5.7	35	249.6	3.0
1	100.2	6.5	36	253.9	1.7
2	104.4	4.2	37	261.4	3.0
3	109.6	5.0	38	266.4	1.9
4	121.5	10.9	39	271.4	1.9
5	128.4	5.7	1940	264.2	-2.7
6	137.6	7.2	41	254.3	-3.8
7	143.9	4.6	42	244.5	-3.9
8	145.2	0.9	43	234.1	-4.3
9	144.0	-0.8	44	225.3	-3.8
1910	143.8	-0.1	45	219.6	-2.5
11	147.2	2.4	46	227.5	3.6
12	150.6	2.3	47	244.2	7.4
13	154.5	2.6	48	274.1	12.3
14	154.4	-0.1	49	310.3	13.2
15	147.6	-4.4	1950	342.7	10.5
16	141.4	-4.2	51	372.4	8.7
17	134.9	-4.6	52	396.8	6.6
18	129.3	-4.2	53	408.7	3.0
19	126.0	-2.5	54	426.8	4.4
1920	130.7	3.7	55	466.2	9.2
21	136.0	4.1	56	499.2	7.1
22	134.2	-1.3	57	501.3	0.4
23	139.3	3.8	58	524.0	4.5
24	146.8	5.4	59	546.6	4.3
25	160.0	9.0	1960	559.5	2.4
26	166.8	4.3	61	559.9	0.1
27	172.9	3.7	62	581.3	3.8
28	180.9	4.6	63	616.1	6.0
29	194.1	7.3	64	630.5	2.3
1930	213.9	10.2	65	647.7	2.7
31	227.4	6.3	66	672.0	3.8
32	233.8	2.8	67	682.0	1.5
33	236.6	1.2			

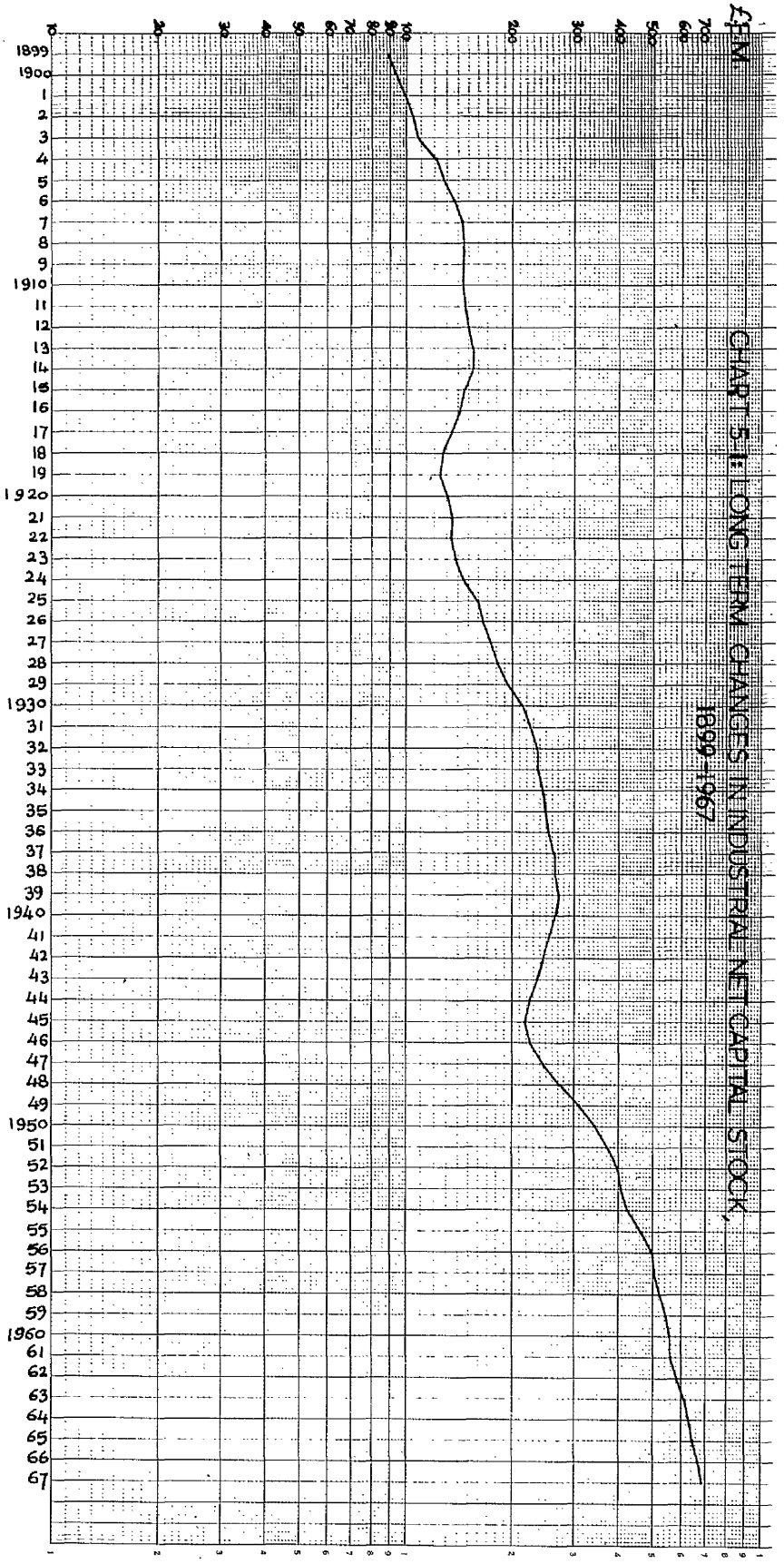

CHART 5:1: LONG TERM CHANGES IN INDUSTRIAL NET CAPITAL STOCK, 1899-1967

it probably began a few years before the first year of the series.[2] By contrast, the second upswing is much longer, the rate of C.F. was rather modest and the evolution of the C.S. less smooth. The third spurt covers the whole post-war period and is one of continuous growth with deceleration in the rate of C.F. as the level of C.S. increases. The two investment downswings are associated with two world wars, but while the second coincides exactly with the years 1939-45, the first started well before 1914 and ended in 1920.

The periodization adopted in the analysis of the series is based on these swings. The main historical features of these periods are briefly summarized as follows:

I. 1899-1907: these 8 years fall during the time of the British occupation of Egypt. They correspond to a period of rapid agricultural expansion and influx of foreign capital. Economic policy can be characterised as free trade. The period ends with the crisis of 1907.

II. 1907-1920: the performance during this period was disturbed by the effects of the 1907 crisis. There followed a very short recovery (1911-13), then came World War I, which was followed by the national revolution of 1919.

III. 1920-1939: these years are marked by the beginnings of national enterprise in the 1920's but the World Depression interrupted for a few years the continuity of economic developments. In 1930 Egypt regained her fiscal independence and imposed protective tariffs.

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2. See Table 5.3 below.

IV. 1939-1945: corresponds to World War II.

V. 1945-1967: the economic system changed during this period from private enterprise with a measure of government intervention to a new set-up dominated by the public sector, planning and strong government involvement in the management of the economy. External events such as the Korean boom, the Suez Crisis and the June 1967 war had serious repercussions on the economy.

Some of the changes in the rate of C.F. do not always correspond to the generalizations commonly found in historical appraisals of industrialization in Egypt. But the figures put into a new perspective views about the pace of industrialization at the beginning of the 20th century and the significance of industrial developments during the 1920's and 1930's. Above all they reveal the underlying continuity of the post war period and help to locate and analyse significant turning points in the long run growth of the Egyptian economy.

In this chapter I attempt first to explain the development of C.S. in each of the periods delineated above. This will involve an analysis of the basic characteristics of each period and a discussion of the main factors affecting the rate of C.F. in each long swing. Secondly I will analyse the structure of the C.S. and its evolution over time. The chapter will be concluded by a brief assessment of the historical implications of this study.

5.2 Interpretation of Movements in Industrial Capital Formation:

Having established the pattern of historical fluctuations in industrial C.F., we now turn to a closer examination of the different swings distinguished above [Summarized in Table 5-2].

TABLE 5-2

SWINGS IN INDUSTRIAL CAPITAL STOCK

Periods	No. of Years	Average Annual level of C.F. £Em. (constant prices)	Average Annual Rate of Growth of C.S. %
I. 1899-1907	8	6.9	6.21
II. 1907-1920	13	0.5	-0.74
III. 1920-1939	19	7.3	3.92
IV. 1939-1945	6	-6.7	-3.47
V. 1945-1967	22	20.0	5.29

5.2.1 1889-1907

This period is characterised by a very high rate of growth of NFCS which averaged 6.21% per annum, the highest for all the periods of our study [Table 5-2]. But the value of the C.S. in 1899 was relatively small (£E.89m. at constant 1960 prices) and small absolute additions would naturally lead to relatively high rates of growth.

The strong upward trend of the C.S. probably started at the beginning of the 1880's. Table 5-3 shows that the average annual level of industrial C.F. (at 1960 prices) has been continuously increasing over the period 1882-1899.

TABLE 5-3

Gross Fixed Capital Formation in Industry, 1882-1904

(Constant 1960 prices)

YEARS	1882-84	1885-89	1890-94	1895-99	1900-04
Value, £Em.	3.527	6.284	5.692	9.537	12.844

Source: Figures prepared for the initial capital stock in industry.

Furthermore the paid-up capital of joint-stock (J.S.) industrial companies increased very rapidly between 1883 and 1897 [See Table 5.4].

TABLE 5-4

Paid-up Capital in Industrial Joint-Stock Companies*

£E. million

YEARS	I	II
1883	0.08	0.50
1892	0.50	1.20
1897	2.00	3.54

* Although the absolute figures of the two estimates are not identical because one of the sources includes debentures and the classification may be different, they both show similar trends.

Source: I. Department de la Statistique, Statistique des Societes Anonymes Par Actions Travaillants Principalement en Egypte, 1907 Cairo, 1909.

II. A.E. Crouchley, The Investment of Foreign Capital in Egyptian Companies and Public Debt, Table II, p.105.

As a result of these and earlier developments, Egypt possessed by 1899, the first year of the present series, a small industrial sector. Thus for the same year the C.S. in agriculture was £E.135.6m [3], while that of industry amounted only to £E.89m.[3].

3. See Tables 4-1 and 5-1 above.

Moreover, Crouchley estimated that industrial companies represented only 11% of the paid-up capital of all joint-stock companies operating in Egypt in 1897.[4]

A brief discussion of industrial developments in Egypt over the 19th century will help to explain the emergence of this relatively small industrial sector at the turn of the century.

Mohamed Ali (1805-1849) first attempted to transform Egypt's subsistence economy into a modern and diversified productive system. After consolidating his authority, the Pasha launched upon an ambitious programme of simultaneous investment in industry, transport, irrigation and agriculture. Long staple cotton was introduced in 1820 and soon began to be exported to Europe. A system of monopoly was established which enabled the State to appropriate trade profits and provided the necessary funds for investment. In 1816 the monopoly was extended to industry, and in 1819, encouraged by foreign advisers, Mohamed Ali decided to build up a European style factory system.[5] Table 5.5 illustrates the range of industrial activities which existed in Egypt by the late 1830's. It was estimated that total industrial investment undertaken by Mohamed Ali up to 1838 amounted to £E.12m.[6] This total figure implies a ratio of industrial investment to exports of 0.36, while the comparable ratio for 1899-1913 is 0.09.[7] The permanent labour force in

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4. Crouchley, The Investment of Foreign Capital..., op.cit., pp. 105-6.

5. Several studies and reports have been made of Mohamed Ali's experiment among which, A. El-Gritly, History of Industry in Egypt, Cairo 1952, M. Fahmy, La Révolution de l'Industrie en Egypte et ses Conséquences Sociales au XIXe Siècle (1800-1850), Leiden: E.J. Brill, 1945; J.A. St.John, Egypt and Mohamed Ali, (2 vols.), London 1934; A. Colin, Lettres Sur l'Egypte; Industrie Manufactutière, Revue des deux Mondes, Vol. XIV, 4th Series, 15 May 1838; and John Bowring, Report on Egypt and Candia, British Parliament Papers, No. XXI, 1840.

6. Ahmed Al-Hitta, Economic History of Egypt, Cairo 1957, p.174.

7. Export figures from A.E. Crouchley, The economic Development of Modern Egypt, London 1938, Appendix Table 6, pp.266-8.

Table 5.5

Employment by Major Branches of Industry Under Mohamed Ali

	000 Workers	% to Total
I. Textiles	64	58.2
Cotton	15	13.6
Linen	30	27.2
Wool	12	11.0
Silk	7	6.4
II. Foodstuffs	11	10.1
Sugar processing & Refining	5	4.5
Rice & Wheat Mills	6	5.6
III. Military	15	13.5
Arsenal	5	4.5
Weapons, Amunition.... etc.	10	9.0
IV. Others	20	18.2
Indigo	9	8.2
Oil & Soap	8	7.3
Paper & Glass	1	0.9
Leather	2	1.8
Grand Total	110	100.0

Source: Moustapha Fahmy, La Révolution de l'Industrie en Egypte et ses Conséquences Sociales au XIXe siècle (1800-1850) op.cit., p.84. Fahmy gives a figure of 260,000 workers for total employment. It excluded the 40,000 building workers and 80,000 cotton weaving and 30,000 linen weaving workers representing artisans working at home and not in factories.

government factories was estimated at 40,000 and total manufacturing employment at between 110,000 and 220,000. Taking the lowest estimate (110,000) and accepting a population estimate of 3.5m. for the late 1830's, the percentage of total population employed in manufacturing was 3.1% compared with 2.5% in 1907 and 2.9% in 1927.[8]

8. Estimates of Egypt's population under Mohamed Ali are unreliable and vary considerably from 2m. for 1840 according to Bowring, to 4.5m. according to the census of houses in 1846. We have chosen the 3.5m. as an average of these estimates. For a discussion of different estimates see H.A.B. Rivlin, The Agricultural Policy of Mohamed Ali in Egypt, Cambridge Mass. 1961, Appendix 6. Figures for the years 1907 and 1927; Department of Statistics and Census, Population Census, 1927.

Mohamed Ali's industrial experiment did not survive his reign. There are two views on the causes of the collapse. One emphasises the loss of markets which resulted from the compulsory reduction of the armed forces in 1841 and the opening up of Egypt and the Levant to foreign competition which followed the signing of the Anglo-Turkish treaty of 1838. The abolition of the monopolies deprived industry of its institutional base. The second view stresses the technical difficulties faced by industry: the lack of a cheap source of motive power, shortages of labour, and problems of organization and management. All led to great inefficiencies and high costs which made the collapse of industry inevitable.[9] Both sets of factors were important. The significance of foreign intervention which led to the loss of Egypt's economic autonomy is that it sealed the fate of the experiment and influenced the course of future industrial development. As Issawi pointed out the collapse of Mohamed Ali's industrial experiment and the abolition of his monopoly system marked the failure of an "attempted leap from a subsistence to a complex economy", "instead the country had launched on the road leading to an export oriented economy".[10]

From then onwards, cotton became increasingly the centre of all economic activity. The pattern of investment was typical of an export economy: public works in irrigation and transport and public utilities to satisfy the new demand generated by the growth of incomes from cotton exports. The industries that can develop in an export economy characterized by free trade and

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9. For a detailed discussion of the collapse of Mohamed Ali's system see A.A-R. Mustafa, "The Breakdown of the Monopoly System in Egypt after 1840" in P.M.Holt (ed.) Political and Social Change in Modern Egypt, London 1968, pp.291-302; and Fahmy, op.cit., pp.

10. Charles Issawi, Egypt Since 1800: A Study in Lop-Sided Development, The Journal of Economic History, Vol. XXI, No. 1, March 1961, pp.7-8.

private enterprise are limited to activities related to elementary processing of the export crop or protected by natural advantages. Private investment, domestic or foreign, is attracted to economic sectors where expected profits are high. In Egypt, the flow of investment from the mid-19th century and for a long time thereafter went into agriculture, trade, transport and finance rather than industry.

The size and structure of the 'modern' industrial sector in 1899, the starting point of the series, can now be seen in perspective. In Table 5-6, we have grouped by industry the 23 J.S. Companies listed by the British Chamber of Commerce. The pattern is revealing. We can distinguish three types of industries; a) the processing of raw cotton for exports (ginning and pressing) which represent 15% of paid-up capital, b) industries protected by the high transport cost of bulky or perishable inputs or outputs such as sugar, beer, cement, bakeries, salt and caustic soda, c) industries traditionally established in Egypt because of their comparative advantage such as Turkish cigarettes, cotton-seed oil and soap. No modern textile industry existed in 1899 as the two companies mentioned in the table had just been established and one of them was soon liquidated while the other, Anglo-Egyptian Spinning and Weaving Co., staggered along until 1912 when it was reorganized with reduced capital as the Filature Nationale.

Table 5.6

Structure of Investment in Egyptian Industry, 1899

Industries	No. of Companies	Paid-up Capital + Debentures £E.000	% to total
I. Cotton Ginning & Pressing	5	532.7	15.0
II. Cotton Textiles	2	292.5	8.3
III. Tobacco & Cigarettes	3	165.0	4.7
IV. Soft Drinks and Beer	3	118.4	3.3
V. Bakeries & Flour-Mills	2	160.0	4.5
VI. Sugar Processing & Refining	2	1,795.0	50.6
VII. Oil and Soap	3	118.0	3.2
VIII. Salt and Soda	1	301.0	8.5
IX. Paper	1	7.7	0.2
X. Cement	1	60.0	1.7
Total	23	3,544.3	100.0

Source: Based on data on paid-up capital and debentures of joint-stock companies operating in Egypt in 1899 declared by the British Chamber of Commerce of Egypt, Alexandria. List of Financial, Manufacturing, Transport and other Companies Established in Egypt, Appendix Table A-14

A small traditional manufacturing sector catering for the poorer groups of the population co-existed with the modern sector. There are no reliable data on its size and the scope of its activities, but the existence of handloom weavers in some provincial centres such as Mahalla and Assiut, as well as Akhmim, and large numbers of craftsmen and artisans in the ~~bazaars~~ bazaars of Cairo is mentioned by many authors.[11]

Between 1899 and 1907, C.F. in industry proceeded at a high rate. [Table 5.2]. An initial phase of industrialization may be identified during that period. Prosperity generated by the cotton boom (the value of cotton exports increased two and a

11. See for example; Germain Martin, Les Bazars du Caire et les Petits Métiers Arabes, Cairo-Paris 1910 and G. Baer, Egyptian Guilds in Modern Times, Jerusalem 1964.

half times between 1898 and 1906) attracted foreign capital and labour into Egypt. The flow of foreign capital into Egypt which began in the middle of the 19th century as loans to the government, was now coming more as direct participation in the form of investment in joint-stock companies. This movement of capital was a part of a much wider movement of foreign investment started first by England and followed by Belgium, France, Germany and Italy. By the end of the 19th century Egypt, with an expanding cotton sector, fairly developed infrastructure, relatively stable government (especially after the Anglo-French Entente Cordiale of 1904) and the immunity given to foreigners under the Capitulation system offered foreign investors a wide range of attractive opportunities. According to Crouchley, "From 1900 to 1907 no less than 160 new companies representing authorised capital £E43,335,000 were formed".[12] The number of Europeans increased from 109,725 in 1897 to 147,063 in 1907, an increase of 35% in 10 years.[13] A building boom, the evidence of which is presented by Eid, took place at the same time.[14] The expansion of markets for such products as beer, cement, cigarettes, manure, and the development of the cotton trade provided investment opportunities for new factories in ginning and pressing plants.

However, the pattern of private investment did not change significantly. In 1907 the share of industrial companies in total paid-up capital and debentures was 11.2% as compared with 10.8% in 1897. Table 5-7 lists 18 industrial companies founded

12. Crouchley, The Investment of Foreign Capital in Egypt... op.cit., p.53.

13. Department of Statistics & Census, Population Census 1927, Cairo 1929.

14. A. Eid, La Fortune Immobilière de l'Egypte, Paris 1907.

after 1899. It indicates that new investment in industry followed the established pattern.

Table 5-7

List of Egyptian Industrial Companies Founded in 1889-1907

	Year of Foundation	Nationality(1)	Paid-up Capital(2) £E000
1. S.A. des Ciments d'Egypte	1900	B	115
2. Elect. & Ice Supply Co.	1903	S	liq.
3. Salonika Cigarette Co.	1903	GK	82
4. Cie. Frigorifique d'Egypte	1904	F	238
5. Nile Cold Storage	1904	E	liq.
6. British Engineering Co. of Egypt.	1904	E	liq.
7. Association of Cotton Ginners	1905	EL	351
8. Rosetta Alex. Rice Mills Co.	1905	Aust.	62
9. Brasserie and Rizerie	1906	B	liq.
10. British Beer Breweries	1906	E	liq.
11. Egyptian Swiss Iron Works	1906	SL	liq.
12. Deutsche Baumwollpresse	1906	G	liq.
13. Elect. & Ice Supply	1906	S	54
14. African Cigarette Co.	1906	E	20
15. S.A. des Briqueteries Méchaniques	1906	B	10
16. Soc. de Publication Egyptienne	1907	L	24
17. United Egyptian Salt	1907	EL	293
18. Callendar's Egyptian Damp Proof	1907	E	liq.

[1] F = French; L = Egyptian; E = English; B = Belgian; G = German; S = Swiss.

[2] liq. = liquidated

Source: Egypt, Department of Statistics, "Sociétés Anonymes..." op.cit., 1907.

Almost all the capital invested in these concerns came from foreigners resident either in Egypt or abroad.[15] Crouchley estimated that the share of paid-up capital of 'Industrial, Mining & Commercial' companies held abroad amounted to 51% which underestimated the extent of foreign participation because most of the capital held in the country was in the hands of Egypt's foreign community who obtained their money either from

15. Crouchley, Investment...., op.cit., pp. 53 and 73.

trading profits or from foreign banks.[16] Evidence suggests that Egyptian participation was limited. Thus Crouchley identifies 33 firms mostly of small size with paid-up capital and debentures worth only £E2,058,082 in 1900 where local enterprise played an important role. Furthermore, almost all these companies were engaged in land and real estate with the exception of one transport company, the Fayoum Light Railway Co. and one industrial company, the Société Générale de Pressage et de Dépôt.[17] Egypt's large estate owners, who were the primary beneficiaries of the rise in agricultural incomes bought land and houses for themselves in Cairo and Alexandria.[18] They also increased their consumption of European imports[19] but did not show much interest in investment in industry, trade or finance beyond the occasional purchase of stock in existing companies, and it was not until the 1920's that an Egyptian entrepreneurial class started to emerge.[20]

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16. For example, the capital for cotton ginning and pressing companies was provided by the foreign-owned cotton export houses out of profits made from cotton trade; see E.R.J. Owen, Cotton in the Egyptian Economy 1820-1914, Oxford 1969, pp.287-8.

17. Crouchley, Investment...., op.cit., p.43. He also remarks that the average capital of 'local companies was £E62,384, while that of foreign companies (excluding Suez Canal) amounted to £E424,642.

18. The value of buildings subject to the Urban-House Tax increased in Alexandria only by nearly £E10m. between 1905 and 1907; see, Eid, op.cit., p.41.

19. Egypt's imports of consumer goods, other than food, represented about 40%, on average, of her total imports between 1885 and 1914. In 1907 alone, 250 cars worth £123,354 were imported, Egypt, Statistical Dept., Annual Statement of Foreign Trade Various Issues and D. Mead, Growth and Structural Change in the Egyptian Economy Irwin, 1967, Appendix V-A-1, p.342.

20. A partial explanation of this phenomenon could be found in the fact that foreigners, under capitulations, enjoyed a fiscal and judicial immunity which gave them advantage over Egyptian competitors. They were in a better position also due to their financial and commercial links with Europe. Egyptians, on the other hand were hampered by various social, cultural and religious factors, see Issawi, "Egypt Since 1800...", op.cit.,pp.23-13.

The reluctance of the majority of Egyptian capitalists to invest in industry can be partly explained by the difficulty to understand the working of a stock market created and exclusively operated by foreigners, a lack of knowledge and experience of industrial ventures, and the existence of alternative opportunities in agriculture and real estate which had proved to be profitable and relatively certain.

In the absence of reliable data on the structure (capital and output) of the whole manufacturing sector we resort to the employment data provided by the 1907 Population Census.

Table 5-8

Population Engaged in Manufacturing, 1907 Population Census

Industry	No. of people employed 000's	% to total
Textiles	83.2	34.0
Clothing (incl. tailors)	45.8	19.0
Food (incl. sugar)	40.7	17.0
Metal work	30.1	12.0
Building Materials	10.3	4.2
Wood and products	12.8	5.0
Leather	1.2	0.5
Chemical products	0.8	0.3
Construction of vehicles	3.9	2.0
Printing and artistic	9.4	4.0
Others	4.4	2.0
Total	242.6	100.0

Source: Egypt, Statistical Department, Population Census of 1907, Cairo, 1909, Table XXI, pp.192-359.

The pattern of employment shown in Table 5-8 reflects the importance of traditional and small-scale manufacturing in textiles (34% of total employment) and clothing (19%) for, as noted earlier, these branches were not represented in the corporate sector. Food which ranked third (17%) was also probably dominated by a large number of small family firms.[21]

21. Out of 40,7000 employed in food industries in 1907, only 3,162 were in tobacco, 402 in beer and other drinks and 130 in sugar refining, while the rest were engaged in flour milling, bakeries, meat preparation and the like. See Department of Statistics & Census, Population Census of 1907, Cairo 1909, Table XXI.

Egypt's industrial structure in 1907 was characteristic of an agrarian economy where manufacturing is dominated by textiles and food products. The share of machinery, transport equipment and chemical products was negligible, and that of intermediate goods, such as metals, building materials and wood, most of which presumably for construction, was relatively small. (21.2%)

To sum up, the high rate of growth of industrial capital during the period 1899-1907, was not accompanied by changes in the industrial structure. New investment continued to flow into activities which had begun in the early 1890's.

The evidence of our capital series and analysis of the industrial structure adds new elements to the historical debate about Egypt's industrial development at the turn of the century. Writers on the Egyptian economy often argued that government policy especially under Lord Cromer (British Consul General, 1883-1907) was extremely unfavourable to industrial development.[22] This position found its extreme expression in Rothestein's "Egypt's Ruin", who as early as 1910, claimed that "In the course of their 28 years' role, the British have not only not succeeded in building up a single manufacturing industry, but have effectually killed whatever possibilities there had been for one".[23] Owen, on the other

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22. For an elaboration of these views see: G. Baer, Egyptian Guilds in Modern Times, Jerusalem 1964, p.137; Charles Issawi, Egypt at Mid-Century, London 1954, p.37; I.G. Levi, "L'Industrie et L'Avenir 1927, p.360; R.L. Tignor, Modernization and British Colonial Rule in Egypt, 1882-1914, Princeton 1966, p.364; and on the views of Egyptian Nationalists see; Minutes and Proceedings of the 1st Egyptian Congress, Alexandria 1911, pp.30-3; 161-6; 168-72; 174-8.

23. T. Rothestein, Egypt's Ruin; a financial and administrative Record, London 1910. pp.307-8.

hand, concluded his discussion of the growth of the Egyptian economy (1880-1914) stating that it "dispels any impression that there was no industrial development at this period".[24] The proponents of the first view lean upon the famous case of Cromer's opposition to the establishment of cotton mills in Egypt.[25] In the 1890's groups of English entrepreneurs tried to establish textile factories in Egypt. Rather than allow them to enjoy the very small protection of the 8% duty on foreign imports of cotton goods, Cromer sought to impose a countervailing duty of the same amount on home-made products. His position was clearly expressed in 1899 in a letter to Salisbury: "There can be no sort of reason why the Government should oppose any proposal which involves placing the home-made on precisely the same footing as the imported goods. On the other hand, it would, for obvious reasons, be detrimental to both English and Egyptian interests to afford any encouragement to the growth of a protected cotton industry in Egypt".[26] He later made it clear to the director of the ill-fated Egyptian Cotton Mills Ltd. (founded in 1899, liquidated in 1907) that if he exempted them from the duty "Lancashire would be up in arms against the Government", and he referred to

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24. E.R.J. Owen, Cotton in the Egyptian Economy...op.cit., p.300.

25. For a well-documented exposition of this case see, E.R.J. Owen, "Lord Cromer and the Development of Egyptian Industry, 1883-1907", Middle-Eastern Studies, Vol.2, No.4, July 1966.

26. Lord Cromer to Marquess of Salisbury, Egypt, No. 3 (1899), p.14. writing to Kimberley, the Foreign Secretary, Cromer reasoned that: "The present enterprise will be on a small scale, but should it succeed it is probably both that the workers of the company now being formed will be extended and that competitors will spring up. In that case the establishment of factories here will obviously produce serious consequences both in respect of the finance of Egypt and the huge trade in cotton goods now carried on between England and this country"., Cromer to Kimberley, 15 April 1895, Public Record Office, F.O. 141/311.

similar troubles in India some years earlier.[27]

It is clear that the Government's policy during this period rested upon an extreme form of the free trade-laissez faire doctrine for even John Stuart Mill accepted the legitimacy of discriminating in favour of infant industries. Egypt was denied the right to protect and encourage its industry, a right which was exercised by sovereign, politically independent states at that time such as the U.S.A. from 1860, Germany, Meiji Japan and most other advanced countries from the 1880's.[28] There is little doubt that the negative attitude of the British administrators to the nascent Egyptian industry "could not have failed to discourage entrepreneurs who might have contemplated the establishment of factory industry of another kind".[29]

This, however, does not imply that no industrial development took place in Egypt during this period. In fact our C.F. series shows a rapid rate of growth during the period 1899-1907. But the type and extent of this industrial development conforms to Levin's description of the pattern of development of an open export economy with investment mainly centred around foreign trade. The income generated from trade contributes to the emergence of a small industrial sector specialised in the processing of the export commodity and the production of a limited number of goods naturally protected from foreign competition.[30]

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27. Atherton to the Directors, 8 March 1901, quoted in Owen, op.cit., p.290.

28. E.J. Hobsbawm, Industry and Empire, The Pelican Economic History of Britain, Vol.3, London 1969, pp.137-8.

29. Owen, Lord Cromer....op.cit., p.293.

30. J.V. Levin, The Export Economies, Harvard University Press, 1960, pp.1-24.

Given that an investment spurt was possible during this period in the absence of positive government policies, one wonders about the scale of industrialisation that could have taken place with encouragement.

5.2.2. 1907-1920:

This period represents a downswing in industrial C.F. Our series shows a sudden drop in the annual average rate of growth of C.S. from 4.6% in 1907 to 0.9% in 1908 and falling further to -0.1% in 1910. The beginning of a recovery in 1911 (average rates of growth amounted to 2.4%, 2.3% and 2.6% in 1911, 1912 and 1913 respectively) was soon interrupted by the First World War during which the rate of capital accumulation was negative (-3.5% on average in 1914-18). This decline continued until 1919. Signs of a slight recovery became apparent only in 1920. [Table 5.1].

The beginning of the downswing coincides with the financial crisis of 1907, which was referred to in Chapter 4.[31] The crash led to a wave of company liquidations. Although the speculative fervour that brought about the crisis was mainly concerned with land, the repercussion on industrial, commercial and mining companies was particularly severe while all mortgage companies seemed to have escaped. Table 5.9 shows the liquidation of companies containing capital from abroad between 1907 and 1914. The impact of the crisis was widespread: many buildings begun in 1907 remained unfinished for several years because of credit restrictions, and the number of bankruptcies registered in the courts increased from 310 in 1907 to 520 in 1908 and 546 in 1910.[32]

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31. Chapter 4 pp. 132-3.

32. Owen, Cotton in the Egyptian Economy...., op.cit., pp.284-5.

TABLE 5-9

LIQUIDATIONS OF COMPANIES CONTAINING CAPITAL FROM ABROAD, 1907-14

	Liquidations			Paid up Capital of all Companies in 1914 (2)	£E'000 % of Liquidations to Total Co.'s 1 ÷ 2
	No.	Paid up Capital in 1907 (1)	% to total		
Mortgage	-	-	-	48,369	0.0
Banks and Financial	10	1,755	21.4	3,229	54.4
Agricultural and Urban Land	9	3,787	46.0	7,261	52.2
Transport	1	429	5.2	3,988	10.8
Industrial, Commercial & Mining	26	2,251	27.4	8,406	26.8
TOTAL	46	8,222	1000.0	71,253	11.5

Source: A.E. Crouchley, The Investment of Foreign Capital in Egypt...., op.cit., pp.66 and 154-5.

Moreover, to the extent that the liquidations resulted in the scrapping of real assets, the reduction in the rate of growth of C.S. after 1907 would have been more pronounced than shown by our series.

The recovery that followed in 1911 resulted from a new wave of foreign investment which flowed back when confidence was restored. Changes in paid up capital between 1907 and 1914 are shown in Table 5.10. But the relative increase in industrial commercial and mining was less than 8% in comparison to 37.5% in mortgage companies and there are no indications of any

change in the allocation of foreign capital between different sectors of the economy.

Table 5.10

Changes in Paid-up Capital of Joint Stock Companies, 1907-14

£E'000

Companies	1907 Held Abroad	1907 Held in Egypt	1907 Total	1914 Held Abroad	1914 Held in Egypt	1914 Total
Mortgage	34,090	5,590	39,680	48,369	6,200	54,569
Banks & Financial	4,895	3,200	8,095	3,229	2,498	5,727
Agricultural & Urban Land	7,135	12,221	19,356	7,261	11,312	18,573
Transport	3,620	2,327	5,947	3,988	2,088	6,076
Industrial, Mining & Commercial	7,170	6,928	14,098	8,406	6,801	15,207
TOTAL	56,910	30,266	87,176	71,253	28,899	100,152

Source: After Crouchley, The Investment of Foreign Capital in Egypt..., op.cit., p.155.

Taking again the ratio of capital subscribed abroad to total paid-up capital of J.S. industrial companies as a proxy of the extent of foreign participation we find that it increased from 51% in 1907 to 55.3% in 1914. Other evidence suggests that local participation (Egyptians and foreign residents) declined significantly between 1907 and 1914 as the liquidators hit local interests more severely and the collapse in 1911 of the Bank of Egypt and the Merchant House of Zervudachi's had discouraging effects on local investors.[33]

The New companies established between 1907 and 1914 are listed in Table 5.11. Industrial expansion during this period

33. Ibid., pp.286-9, and Crouchley, Investment...., op.cit., pp.65-8 and 115-6.

seems to have followed the established pattern. Note, however, the dominance of building materials, the emergence of the first shoe factory and the foundation of the Filature Nationale which took over from the Anglo-Egyptian spinning and weaving in 1912. Gorst, Cromer's successor, had suspended duty in 1909 and for five years the countervailing excise/which enabled this lone textile factory to survive.[34]

Table 5.11

List of Egyptian Companies Founded in 1908-1914

Name of Company	Year of Foundation	Nationality*	Paid-up Capital £E'000
1. Platrieres de Ballah	1908	F	24
2. The Manure Co. of Egypt	1909	E, S	39
3. S.A. des Brasseries d'Egypt	1909	B	144
4. Nestor Gianaclis, Ltd.	1909	E	793
5. Cairo Sand Bricks	1910	E, S	51
6. Soc. des Tuyaux et de Poteauxeu, Ciment Arme	1911	G	12
7. Egyptisch Egrenir Fabriken	1912	G	50
8. Filature Nationale d'Egypte	1912	E	49
9. Kodak (Egypte)	1912	Am	12
10. Egyptian Shoe Co.	1912	G	12
11. The National Ginning Co. of Egypt	1913	L	20

* F = French B = Belgian
L = Egyptian G = German
E = English S = Swiss

Source: Egypt, Department of Statistics and Census, Societies Anonymes Travaillant Principlement en Egypt, various issues.

34. E.R.J. Owen, The Attitudes of British Officials to the Development of the Egyptian Economy, 1882-1922, in M.A. Cook (ed.), Studies in the Economic History of the Middle East, Oxford University Press, 1970, pp.485-500.

The First World War interrupted the short recovery of 1911-13. The disruption of world trade and the restriction of capital movements explain the negative rate of growth of industrial capital shown in our series.

The war brought home to Egypt in a disagreeably clear manner the deficiencies of its economic structure. The difficulties encountered in exporting the country's produce, especially cotton, and importing manufactured goods showed how vulnerable the country was if it depended entirely on agriculture. Nevertheless, the war created circumstances favourable to industry. The weakening of foreign competition provided a protected market for local industry. The expenditure of occupation and Allied troops added to demand for manufactures. The size of the market was further increased because of the growth of incomes resulting from the rising prices of cotton, which more than compensated the fall in volume of exports especially after 1916. Industrial output increased during the war despite the difficulties of importing capital and intermediate goods. A report on the successful "Exposition des Industries Egyptiennes" held in Alexandria in 1916, mentioned the appearance of new goods manufactured for the first time since the war. These included wood products, carpets and certain items of textiles and clothing.[35] The report also provided indirect evidence on the growth of industrial output during the war. The increase of yarn imports between 1915 and 1916 is taken as an indication of the expansion of the textile industry. Imports of furniture decreased from £E.118,000 in 1913 to £E.20,000 in 1915, which was much greater than the decrease in consumption. It also mentions small

35. R. Maunier, "L'Exposition des Industries Egyptienne", L'Egypte Contemporaine, No. 28, Nov. 1916, pp.434-435.

exports of sugar to Mediterranean countries and beer to Cyprus and Rhodes.

The development of industry during the war can be inferred from the composition of manufacturing employment as revealed by the 1917 Population Census (Table 5.12). The large and rising shares of clothing (25% in 1917 against 19% in 1907) and wood products (15% against 5%) indicates the response of those industries to increased war-time demand.

Table 5.12

Population Engaged in Manufacturing, 1917 Population Census*

Industry	No. of People Employed '000's	% to total
Textiles	72.8	20.3
Clothing (including tailors)	89.9	25.1
Food (including sugar)	61.8	17.2
Metal Work	28.5	7. 9
Building Materials	10.2	2.8
Wood and Products	56.0	15.6
Leather	2.5	0.7
Chemical Products	2.0	0.6
Construction of Vehicles	4.3	1.2
Printing and Artistic	11.8	3.3
Others	18.9	5.3
Total	358.7	100.0

*The Census gives a total of 489,695 for employment in manufacturing. I adjusted this figure to exclude activities not related to this sector such as personal services, builders and transport workers.

Source: Department of Statistics and Census, The Census of Egypt Taken in 1917, Vol. II, Cairo 1921, Table III, pp.38-457.

The negative rate of C.F. continued during 1919, and recovery in 1920 was very slight. The profits of landowners, cotton exporters and merchants accumulated between 1914-18 were to some extent used to acquire real estate which led to a boom in the prices of both urban and rural land. Building activity resumed with greater intensity in the towns. Large sums were invested in British Government securities, and there was a

small but significant increase in the holdings of Egyptian Government securities.[36] The immediate effects of World War I were different from those of the Second War which was soon followed by a rapid accumulation of industrial capital. In 1919-20 the resumption of imports under free trade subjected domestic industry once again to foreign competition which, according to Crouchley, put out of action the greater part of the new industrial ventures started during the war.[37]

The war, however, by demonstrating weaknesses in the Egyptian economy, developed the national awareness of the need for industrialization.

The call to introduce new industries into Egypt came strongly from S. Sornaga (the owner of a building-material factory) in his book L'Industrie en Egypte published in 1916.[38] Sornaga saw the necessity of creating new industries to process the country's agricultural raw materials if the dangers of monoculture and population growth were to be averted. Recognizing the enormous difficulties involved in such a programme, he argued that the success of private enterprise was only possible through a carefully planned policy of support from the State.

These arguments gained support and the Government responded by appointing the "Commission du Commerce et de l'Industrie" in March 1916. The Commission submitted a "Rapport" in 1917

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36. Crouchley, The Economic Development of Modern Egypt, op.cit., p.190-4.

37. Ibid., p.227.

38. S. Sornaga, L'Industrie en Egypte: Quelques Idées et Propositions Dictées par l'Experience Pour Contribuer à établir un Programme Complet et Organique pour le Développement de l'Industrie en Egypte, Cairo 1916.

which provided a detailed description of Egyptian industry; its history, actual condition, difficulties, and suggestions for further development.[39]

The "Rapport" makes the usual distinction between the two sectors of manufacturing, the traditional, called "Petite Industrie" and the modern, "Grand Industrie". The distinction being based on employment and production techniques. "Petites Industries" employed a limited number of workers or consisted of self-employed artisans assisted by apprentices. They covered such activities as building, textile, dying, metals, wood, tanning, shoes, flour-milling, chemical (soap, oils,...) and objet d'art (jewellery ...). While these industries were generally scattered all over the country, some centres retained their traditional reputation which accounted for a degree of localization in towns such as Cairo (the main centre). Mehalla (cotton, silk, textiles), Damietta (silk), Kalioub and Akhmim (shoe-making), Kenah (pottery), Nakkada (cotton textile for Sudan).[40] The production unit was the workshop "Warsha", run by the owner, "Usta", who in most cases, worked on his own, assisted by one or more apprentices, "Sabi".[41] Under the pressure of war conditions most of these workshops had increased their output by taking on more labour.[42] In the villages the

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39. Gouvernement Egyptien, Rapport de la Commission du Commerce et de l'Industrie, Cairo 1918. Members of the "Commission" represented the Government, the business community in general and emerging Egyptian capitalists in particular. It was presided over by Ismail Sidky, later Prime Minister, and included people like Talaat Harb and Youssef Aslan Cattaui, founders of Bank Misr.

40. Ibid., p.47.

41. These activities were usually practiced by Egyptians except for few foreigners in Cairo and Alexandria.

42. Rapport de la Commission..., op.cit., p.47.

workshop was a part of the extremely inconvenient rural habitat. In towns conditions were not much better. Despite the war profits, the owners did not care to spend on innovations. The largest textile factory in Cairo, for instance, was in a ruined building deprived of sun and ventilation. In another prosperous factory the owner was still using animal-power and workers had to work side by side with the oxen. Old production techniques were generally adhered to (except in workshops owned by foreigners) out of ignorance and hostility to new innovations. This, together with the complete lack of business organization (reflected in the absence of organized accounts) contributed to the fact that local products were dearer, in some cases, than imports.[43]

The "Rapport" concluded that the small "atelier" has been, and will be, the predominant type of organization. "Sa persistence y est favorisée par le manque de capitaux et de réserves. Le travail humain continuera donc à rester le facteur principal de la production".[44]

The "Commission" also surveyed the "Grande Industrie". As the name suggests, it includes "factory industries" operating on a large scale in terms of raw materials and labour, and using mechanical power. This sector, though a recent development in Egypt, included such important enterprises as the Filature Nationale de l'Egypte (consuming annually 50,000 cantars of cotton to product 3.5m.lbs. of yarn and 8.9m. yards of cloth), La Société de Sucreries (producing 100,000 tons and employing 17,000 workers), Alcohol (11m. kilos annually), Oils (consuming 25% of the total production of cotton seed to produce 140,000 barrels of oil and 100,000 tons of cottonseed cake). Besides

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43. Ibid., p.48.
44. Ibid., p.50.

these industries, "comparable en étendue et en puissance, aux plus grandes industries européenes", other industries were developed to meet the demand of Egyptian consumers. These were metals, cigarettes, cement, salt and soda, tarbouches, bricks, pipes, beer, rubber and other agricultural industries such as cotton-ginning, rice-bleaching and flour milling.[45]

The "Rapport" commented, "Rien de ce qui est établir dans les autres pays, surtout ceux où l'industrie est naissante, n'à été tenté en Egypte".[46] The government and consumers preferred foreign to local products, obliging entrepreneurs to give their products a foreign label. Industry lacked financial facilities, privilege in government contracts, or protection. Excise duties were high. Local capital "habitués par des siècles de routine" refrained from investing in such enterprises and almost all the companies of the modern sector were owned by foreigners.[47]

The "Commission" came to the conclusion that despite the difficulties Egyptian industry had to contend with, it has been successful in meeting local demand and, as the War conditions revealed, was capable of development, provided prerequisites for such development were established. To achieve this end the "Commission" offered general practical recommendations. Most important it suggested a reformof the tariff system so as to protect domestic industries,[48] and a government department charged with the development of industry and commerce (following the example of the Board of Trade in England and the Ministère du Commerce et du l'Industrie in France).[49] Technical and industrial education should be developed to supply factories

45. Ibid., p.51 and Appendix, pp.145-67.
46. Ibid., p.52.
47. Ibid., pp.52-3.
48. Ibid., Chapter IX.
49. Ibid., Chapter X.

with skilled labour[50]. The "Commission" also recommended the establishment of a new bank to provide industry with necessary credit[51] and suggested potential lines for development such as paper, pottery, glass, sulphuric acid, chemical fertilizers, sisal and food[52]. Finally, the "Commission" called on Egyptian capitalists to abandon their traditional investment in land and direct their funds to industry[53]. It was not until the 1930's, when Egypt regained her fiscal autonomy, that most of these recommendations were first put into practice.

5.2.3 1920-1939

The inter-war period represents the second investment spurt in Egyptian industry. The annual average rate of growth of C.S. during this period (3.92%), though not as impressive as the two other spurts of 1899-1907 (6.21%) and 1945-67 (5.29%), represents a clear departure from the negative rate of C.F. during 1907-20 (-0.74%). Table 5-1 shows that though the recovery from the effects of the War was slow, the 1920's witnessed a continuous, though uneven, acceleration in the rate of C.F. until it reached the impressive level of 10.2% in 1930. From then until 1939, the rate of C.F. continued to increase but at a relatively modest rate of 2.4% on average per year.

Looking at the period as a whole, it may be surprising to note that the rate of C.F. during the 1920's and 1930's (a period conventionally regarded as making the beginning of industrialization in Egypt) was in fact low compared to the two other upswings. This, however, can be explained by reference to the developments that took place during this period. The restoration of foreign competition put the economy back to the pre-1914 situation with a significant

50. Ibid., Chapter X.
51. Ibid., p.87.
52. Ibid., pp.71-8, and Appendix pp.19-35.
53. Ibid., Chapter XII.

difference. The conditions surrounding the flow of foreign capital changed drastically. According to Crouchley, there was a considerable decrease in both the value and the share of Egyptian securities held abroad between 1914 and 1934 [Companies' stocks held abroad in 1914 £E71,253,000, in 1934 £E45,183,000; share of debentures held abroad fell from 85% in 1914 to 42% in 1934]. [54] Many companies operating in Egypt seem to have used a portion of their war and post-war profits to purchase shares held abroad and to repay debentures. However important the inflow of foreign private capital may have been compared with the pre-1914, period, the considerable outflow which characterised the post war years resulted in a large reduction in Egypt's foreign debt. "The foreign holdings of Egyptian Public Debt had fallen from £E85,683,110 in 1914 to £E39,003,000 in 1934, a drop of £E46,580,000. While in the same period there had been a reduction of £E26,070,000 in shares and debentures held abroad of companies operating in Egypt. Egypt had thus repaid her foreign creditors, either by redemption or repurchase, the sum of £E72,750,000 which should have been reflected in the returns as excess exports". It seems that this outflow of capital has led to the starvation of Egyptian industry of badly needed funds. [55]

On the other hand, industrialists still operated in an economic environment that had long hindered the growth of local industry. The State remained passive. "Malheureusement", complained I.G. Levi, "la plupart de ces industries vivent d'une vie précaire. Devant la concurrence étrangère qui se fait de plus en plus menaçante, non seulement rien n'a été fait par l'Etat pour encourager l'industrie, mais il semble qu'au contraire on cherche à paralyser toute initiative en cette

54. Crouchley, Investment ..., op.cit., p.169.
55. Ibid., p.200.

matière".[56] They still received no tariff protection and customs duties failed to discriminate between imports of raw materials and finished goods. For example imports of raw materials for the leather industry were subject to 15% duty while those of finished goods to only 8%. The absence of preferential transport rates designed to lower the cost of production was felt detrimental. Railway charges favoured imported products because rates between Cairo and Upper Egypt were the same as from the port of Alexandria to the same localities. Moreover, the cost of transport from Cairo to Alexandria, Suez or Wadi Halfa was much higher than that from Liverpool or Marseille to Suez or Port Sudan. The Government's purchasing policy rarely favoured local products. In fact, it was customary for Egyptian industries to tender their offers to the Egyptian administration through the purchasing bureau in London. The unsympathetic attitude of the Government manifested itself in high excise duties, endless bureaucratic formalities and absence of legislation on trade marks. Many enterprises had closed down because of excessive foundation fees or difficulties to obtain licenses to import machinery.[57] The recommendations of the "Commission" had not begun as yet to change attitudes.

To the unsympathetic attitude of the state must be added the familiar difficulties arising from the narrowness of local markets which once served by the early established industries did not provide great scope for expansion. There was no organized system of industrial credit. The banks traditionally financed cotton exports and gave secure loans for the purchase of buildings and land.[58] Consumers had a preference for foreign

56. Levi, "L'Industrie et l'Avenir Economique...", op.cit., pp.363-4.

57. Ibid., pp.364-9.

58. M.A. Rifaat, The Monetary System of Egypt, London 1935, p.101.

goods and were prejudiced against local products. Many industrialists gave their goods a foreign label to be able to sell them[59]. Finally, the reluctance of Egyptian capitalists to invest in industry, owing to the attraction of land and buildings, was still strong in the beginning of the 1920's.

Counter to these unfavourable conditions, three important developments took place which made the 1920's and 1930's a turning-point in the history of Egyptian industry, perhaps not so much for resulting in a high rate of capital accumulation, but for creating the necessary conditions for an industrial spurt. These were: the development of national enterprise, the successive cotton crisis which culminated in the Great Depression and reinforced the need for diversification in the local economy, and more positive government action notably the tariff reform and the creation of a credit fund for industry.

One very noticeable feature of postwar investment in Egypt was the increased participation of local capital. Between 1914 and 1933, total paid-up capital of the 17 new joint-stock companies operating in industry and mining amounted to £E.4.7m. out of which local capital contributed 34.5%[60]. But "local" Capital does not necessarily mean Egyptian capital. In fact, most of the post-war investments came from such traditional sources as bankers and financiers, and merchants of European extract, who had resided in Egypt for generations. A slow but significant development was the emergence of a number of new companies financed and managed exclusively by Egyptians. Bank Misr was the institutional expression of that development.

As early as 1879, a group of prominent Egyptians, including Omar Lutfi and Sultan Pasha demanded the creation of a national bank and a young employee of Daira Sanya called Talaat Harb (later founder of Bank Misr) published a book entitled "Egypt's Economic Remedy; or a project of a Bank for the Egyptians" in

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59. Levi, op. cit., p.369.
60. Crouchley, Investment..., op. cit., pp.89-90.

which he expressed his confidence in the business ability of Egyptians and the availability of Egyptian funds for his scheme. Harb continued his campaign until 1916 when he was called upon to serve on the "Commission". Citing Germany's example he again urged the creation of a bank to finance industrial development.[62]

By 1920, the national movement for independence was gaining ground. Many Egyptians had come to believe that political independence needed to be consolidated by economic independence. At that time T. Harb decided to launch Bank Misr in 1920. The bank started with a modest initial capital of £E80,000 in £E4 shares which was contributed by 125 prominent figures, paying between £E100-4000 each.[63]

Several favourable factors contributed to the rapid growth of the new bank; good management, relaxation of Muslim prohibition on interest, and the enthusiasm of the public.[64] By 1933 the Bank's capital amounted to £E1.0m., reserves to £E794,697 and the sums in current and deposit accounts to £E8,9m.[65] Bank Misr drew deposits from quarters hitherto unaccustomed to banking habits, as indicated by the following

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62. Imprimerie Misr, Collection of Speeches by Talaat Harb Bey, Managing Director of Bank Misr, Cairo 1927 (Arabic) pp.13-44.

63. Among the shareholders were Adli Yagin (minister), Ali Maher (many times prime minister), Kamel Sidky, Nagib Iskandar (rich copts), Rashwan Mahfouz, Fouad Sultan, El-Sheity (textile merchants), Islam, Cicurel (store owners, (Ahmed Shawki (leading poet), Dr. Ali Ibrahim (famous surgeon), Dr. Ibrahim Nagi (writer), and Abdel-Rahman El-Rafie (famous historian). It is interesting to note that Egyptian landlords do not figure prominently on the list as most of them retained their conservatism despite the huge profits they accumulated during and after the War; See Bank Misr, The Golden Jubilee; 1920-1970, Cairo 1970, p.153-4.

64. Rifaat, The Monetary System of Egypt, op.cit., pp.137-142.

65. See Bank Misr, The Golden Jubilee 1920-70, Cairo 1970 Pp 170-73.

table showing the Bank's deposits in its first decade.

Table 5.13

Bank Misr Deposits, 1920-29

End of Year	Deposits £E000	Accounts	Average Holdings £E
1920	201	492	409
1921	405	1,717	236
1922	981	5,114	192
1923	1,769	8,705	203
1924	2,624	12,795	205
1925	3,190	17,710	180
1926	4,425	23,680	187
1927	5,518	29,335	188
1928	6,733	34,218	197
1929	7,250	39,694	183

Source: M.A. Rifaat, The Monetary System of Egypt, London 1935, p.136.

Not only did the Bank attract saving but it played a significant role in the development of industry. In contrast to the foreign banks operating in Egypt, Bank Misr persistently pursued a policy of active participation in local industry and trade.[66]

Its participation took two forms; loans to local industry and the flotation of new companies. These were "distinctly new features in the credit structure, and the bank is virtually alone in this field".[67] Thus by the mid-1920's, Bank Misr embarked on an ambitious programme of company promotion in printing (1922), cotton ginning (1924), transport and navigation,

66. The Bank developed along lines lying midways between pure deposit banking in the English tradition and pure long-term financing in the continental tradition of the "Banques d'Affaires". Ali El Gritly, The Structure of Modern Industry in Egypt, l'Egypte Contemporaine, Nos. 241-2, November-December, 1947, p.433.

67. Rifaat, The Monetary System of Egypt, op.cit., p.142.

and cinema (1925). Talaat Harb was aware of competition which came with the turn of free trade and from the foreign community of industrialists within Egypt who grouped themselves in the "Fédération Egyptienne des Industries", in 1922. Yet he succeeded in identifying Bank Misr with the country's drive for economic independence. The leading political party at that time, the Wafd, found in the bank an expression of economic nationalism and adopted a policy designed to boycott English products and banks and recommended that Egyptians should deposit their money with Bank Misr.[68]

But Harb knew that success could not be assured by nationalist sentiment alone. In fact, it was not until the government promised in 1927, that the commercial treaties between Egypt and other European countries would not be renewed, and that the tariff system would be reformed, that the bank launched its largest enterprise, Misr Spinning and Weaving, followed by other enterprises in silk and linen and fisheries.[69]

68. Shohdi A. El-Shafei, History of the National Movement in Egypt, 1882-1965, Cairo 1957, p.50.

69. F. Harbison and I.A. Ibrahim, Human Resources for Egyptian Enterprise, New York, 1958, note to p.45.

Table 5-14

Bank Misr Companies, 1922-1940

	Foundation	Initial Capital £E000	% share of Bank Misr	Capital at end of 1938 £E000
1. Imprimerie Misr	1922	5	66	50
2. Soc. Misr Pour le Commerce et l'Egrenage du Coton	1924	30	23	250
3. Soc. Misr Pour le Transport et la Navigation	1925	40	85	150
4. Soc.Misr Pour le Theatre et le Cinema	1925	15	81	25
5. Soc. Misr Pour la Filature et le Tissage du Coton	1927	300	26	1000
6. Soc. Misr Pour le lin	1927	10	84	45
7. Soc. Misr Pour les Pecheries	1927	20	95	75
8. Soc. Misr Pour le Tissage de la soie	1927	10	74	75
9. Banque Misr - Liban	1929	160	83	n.a.
10. Soc. Misr pour l'Exportation du Coton	1930	120	61	160
11. Misr Air	1932	20	47	80
12. Vente de Produits Egyptiens	1932	5	28	80
13. Misr Assurances	1934	200	43	200
14. Misr Navigation Maritime	1934	100	50	200
15. Misr Tourisme	1934	7	48	7
16. Soc. Misr Pour la Filature et le Tissage Fin	1938	250	49	500
17. Misr Concrete	1938	6	6	6
18. Misr Beida Dyres	1938	250	37	400
19. Soc. Misr Pour les Mines et Casrieres	1938	40	88	40
20. Soc. Misr Pour l'Industries des Huiles	1938	30	78	30
21. Soc. Misr Pour les Produits Pharmaceutique	1940	10	10	-

Source: Bank Misr, The Golden Jubilee, 1920-1970, Cairo 1970, pp.53 and 113.

Bank Misr has been instrumental to industrial development during the interwar period. The share of Bank Misr industrial companies established between 1922 and 1938 amounted to £E2.5m. or 45% of the increase in the total paid-up capital of all joint-stock industrial companies during the same period.[70]

Looking at Bank Misr in the historical context of the country's experience of economic growth, it could be concluded that its emergence has been deeply significant. This significance has been due not merely to the amount of funds the bank mobilized, but perhaps more to the qualitative change it brought about in attitudes and institutions. Bank Misr represented Egypt's new national entrepreneurial class. It was an institution that made good/the defects in the national credit structure, and it created a framework for the support of Egyptian enterprise.

The second factor which influenced the rate of C.F. from 1920-39 was the awareness of the dangers of monoculture and the need to diversify national production. This need was stressed in a report submitted to the Finance Minister by Talaat Harb and Youssef Aslan Cattaui in 1929.[71] Citing the historical experience of industrialization in other countries (such as Germany, England, France, Belgium, as well as Rumania, Turkey and Greece) their report recommended that a number of industries should be established within the framework of a national industrial programme, and recommended government

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70. Total paid-up capital of all industrial companies operating in Egypt increased from £11.1m. in 1922 to £E16.3m. in 1938. Egypt, Department of Statistics and Census, Statistique des Sociétés Anomymes Travaillant Principalement en Egypte, 1946, Cairo 1948.

71. Bank Misr, Creation of National Industries and the Organization of Industrial Credit: A Project for an Egyptian Industrial Bank, Cairo (Arabic), 1929.

participation in the provision of credit facilities. Despite a succession of agricultural crises in 1920, 1921 and 1926 Egypt's government of wealthy landlords showed little awareness of the need to develop industry. Not until the Depression (1929-1932) did Egypt's ruling class (which until then had been doing very well out of cotton) begin to be even dimly conscious that the economy had taken an unsatisfactory turn. Egypt, like all other primary exporters faced a situation where, between 1929-33 the quantum of world exports fell by 25%, and the general level of export prices by 30%, entailing a fall of over 50% in the total value of world trade.[72] Egypt experienced a marked deterioration in her terms of trade during the Depression years from which the economy did not recover until the late 1940's. [Table 5-15].

Table 5-15

Index of Egypt's Terms of Trade, 1910-1951

(1953 = 100)

Years	Terms of Trade	Years	Terms of Trade	Years	Terms of Trade
1910	235.9	1924	207.7	1938	90.3
1911	202.6	1925	256.2	1939	82.3
1912	201.2	1926	166.0	1940	73.2
1913	212.0	1927	188.4	1941	54.3
1914	172.6	1928	187.3	1942	50.9
1915	123.2	1929	178.1	1943	58.5
1916	146.5	1930	135.5	1944	72.3
1917	145.6	1931	111.0	1945	72.4
1918	99.9	1932	113.6	1946	87.3
1919	137.3	1933	110.7	1947	88.8
1920	243.4	1934	119.7	1948	130.7
1921	116.4	1935	129.0	1949	117.0
1922	166.6	1936	129.4	1950	149.1
1923	182.5	1937	103.3	1951	206.9

Source: D.C. Mead, Growth and Structural Change in the Egyptian Economy, Illinois, 1967, Appendix Table V-A-7 and notes to Table V-A-9.

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72. Celso Furtado, Economic Development of Latin America: A Study from Colonial Times to the Cuban Revolution, Cambridge University Press, 1970. p.39.

For most primary producing countries the Depression brought into question the utility of the traditional system of international division of labour. The arguments for strict international specialization seemed more and more dubious. The stagnation of exports (which has been variously explained in terms of supply inelasticities and the low income elasticity of demand for primary products), reinforced the belief that an alternative should be sought, to international trade as an 'engine of growth'.[73] Egyptians were more than ever convinced that their future prosperity was in the diversification of the economy. In a lecture delivered in 1934, the influential Abdel-Wahab Pasha, under-secretary, and later Minister of Finance, stated that "The most important lesson of the Depression was to make very clear the dangers of relying exclusively on one source of wealth; agriculture, and a single agricultural crop: cotton". He indicated that "there was a scope for the establishment of new industries especially agricultural industries and those for which raw materials were available in the country".[74]

Out of the depression came new Government Policies. Until 1930 tariffs had been considered as a source of revenue but were not employed to protect infant industries. But when Egypt regained fiscal autonomy, at the recommendation of the Fédération Egyptienne des Industries, the government introduced a mildly protective tariff system. The general rate of 8% "ad valorem" was replaced by "specific" rates on imports of

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73. R. Nurske, Patterns of Trade and Development, Wicksell Lectures 1959, pp.33-48; and C. Kindelberger, Foreign Trade and the National Economy, M.I.T., 1964 pp. 195-211.

74. Ahmed Abdel Wahab Pasha, The Lessons of the Crisis, lecture delivered on 30 April 1934 at the Teachers Club, Cairo, 1934.

manufactured goods varying from 12-20%.[75] Lévi and Gaddhi criticised the new system because as they saw it "contrary to other countries, Egypt has not, therefore, adopted in her tariff system a definite and complete programme capable of ensuring the defense of her already existing industrial interests not to mention the ultimate development of her thriving industries".[76] Egypt's new import duties were certainly low compared with those of highly industrialized countries. Rates in USA for example ranged from 40-50% and sometimes exceeded 80% ad valorem, and those of Britain were generally of the order of 33⅓% and in some cases amounted to 50% ad valorem.[77] Even though Egypt raised her tariffs on several occasions during the 1930's, they remained relatively low as the following comparison with Turkey in 1937 suggests:[78]

	Sugar	Cotton Yarn	Woollen Yarn	Cotton Textiles	Woollen Textiles	Paper	Cement
EGYPT	35	25	20	20-25	17.5-25	35-45	40
TURKEY	194	26	44	63	145	88	10

The Government implemented other policy measures to encourage industry. In state purchases it favoured local products even if their prices exceeded by 10% those of foreign products. The modest "Industrial Credit Fund" deposited by the Government with Bank Misr in 1922 for small loans to

75. For a summary of the history of Egypt's customs system see Egypt, Dept. of Statistics, Annual Statement of Foreign Trade, 1930", pp.5-19.

76. I.G. Lévi & L. Gaddhi,"Observations Générales sur le Nouveau Tarif Douanier", l'Egypte Contemporaine No. 134, March 1932.

77. M.M. Hamdy, A Statistical Survey of the Development of Capital Investment in Egypt Since 1880, unpublished Ph.D. Thesis, London 1943, p.269.

78. U.N., The Development of Manufacturing Industry in Egypt, Israel and Turkey, New York 1958, Table LI, p.129. Figures represent customs' duties as % of c.i.f. value of imports.

industrialists was increased from £E100,000 to £E250,000 in 1927, and to £E750,000 in 1931. The Fund did not solve the problem of finance especially for small industrialists who were unable to provide the necessary guarantees for the loans. In the first three years only 32 loans totalling £E18,650 were granted and it was not until Bank Misr offered to act as a guarantor that loans increased to £E1,136,759 in 1938.[79]

The three forces discussed above; the emergence of national enterprise, the Depression and the delayed government action, help to explain the pace and character of industrialization during the 1920's and 1930's. The accelerated rate of C.F. between 1920 and 1930 is not unrelated to the emergence of Bank Misr and its industrial affiliates. There was a cluster of new industrial foundations at the end of the 1930's, the largest being the Société Misr Pour la Filature et le Tissage du Coton established at Mehalla El-Kobra in 1927. The depression had complex effects. Its impact on Egypt seems to have been particularly severe in 1931-34. The terms of trade reached their lowest ebb in 1933 [Table 5-15], exports and imports in 1932 and 1933 respectively as shown in the following table.[80]:

Years	Average 1920-24	Average 1925-29	1931	1932	1933	1934	1935
Exports (£E000)	61902	52729	28792	27708	29519	31624	36680
Imports(£E000)	63141	57267	31528	27425	26767	29304	32239

Incomes were depressed, business confidence shattered, and credit tight. This explains the low rate of C.F. in industry shown in our series between 1931 and 1936.[Table 5-1]. But the Depression, in so far as it increased awareness of the

79. Bank Misr, The Golden Jubilee, op.cit., pp.53-7 and 71-3.
80. Mead, op.cit., Appendix Table V-A-I to V-A-4.

need for industry and prompted the government into a more positive attitude, had long-term repressions which began to be felt by the end of the 1930's. The tariff reform of 1930 had no immediate impact since it coincided with the Depression, but it inaugurated a new era during which Egyptian industry was able to grow under protection. The favourable effects of all these factors can be felt in the late 1930's but here again, like the short recovery of 1911, a World War interrupted what might have been a long-term upswing in industrial C.F.

Table 5-16

Employment in Manufacturing, 1937
(Establishments with 10 and More Workers)

Industries	No. of Employees (thousands)	% to Total
Food	32.5	23.3
Beverages and Tobacco	10.3	7.4
Textiles	40.5	29.0
Clothing and Footwear	9.6	6.9
Wood and Products	4.2	3.0
Paper and Products	2.5	1.8
Printing and Publishing	6.9	4.9
Leather	1.4	1.0
Rubber	-	-
Chemicals	6.4	4.6
Petroleum	0.2	0.1
Non-Metallic Minerals	7.7	5.5
Metals and Products	11.5	8.2
Transport Equipment	-	-
Others	5.9	4.2
Total	139.6	100.0

Source: Department of Statistics and Census, Census of Industrial and Commercial Production, 1937, Cairo 1939.

The significance of the period 1920-39, however, lies not so much in the extent of industrialization that occurred because the rate of C.F. was low in relation to the other upswings. Its significance lies rather in a change in environment, attitudes and policies affecting investment, the increased participation of local capital and entrepreneurship and also in the beginnings of structural change in the industrial sector.

Thus the textile industry which was represented in the 'modern' sector by a single company, the Filature Nationale, expanded considerably. Output of cotton fabrics increased from 8m. meters in 1920 to 93m. meters in 1938, and that of cotton yarn from 3,000 tons in 1928 to 21,000 in 1938. Another development was the emergence of an oil industry. Egypt began to produce motor spirit, Kerosene and heavy oil, in the 1920's. The production of Portland Cement expanded rapidly from 24,000 tons in 1920 to 375,000 tons in 1938.[81] Data for other commodities are not available. The structure of employment in establishments engaging 10 persons and more (which could be taken as the modern sector) reveals the diversity of Egypt's industrial enterprise in 1937 [Table 5-16].

The nature of industrial development during the 1920's and 1930's differed from that of the early 20th century which was stimulated by the expansion of the export sector. Industrialization during the interwar years provoked by the inadequate growth of cotton exports in a country in which population was rapidly increasing, partly by new institutions such as the Misr Group, and, towards the end of the period, by the tariff reform.

5.2.4 1939-1945

The second downswing in C.F. coincided exactly with the Second World War. The average annual rate of growth of C.S. was -.347% the worst performance throughout the whole period (1899-1967). Egypt was cut-off from its foreign suppliers of machinery and intermediate goods. Disruption of trade was more severe than during World War I. However, the Second

81. Annuaire Statistique, various issues.

World War greatly stimulated Egyptian industry. As in the Great War, local products had to replace imports. Demand was inflated by allied military expenditure which amounted on average to some 25% of the country's national income.[82] Moreover, the increased number of the Egyptian Army (from 22,000 in 1937-8 to 45,000 in 1945); and the wages paid by the Allied Armies to the 20,000 civilians employed on the construction and maintenance of military installations also increased local expenditure upon manufactured products.[83] The War also opened up new markets in the neighbouring Middle Eastern countries suffering from similar shortages.[84]

Furthermore, the inflationary process concomitant to the war, resulted in huge profits in manufacturing. Between 1939 and 1945, the official index of wholesale prices (1939 = 100) increased by 23% and the index of net company profits (1938 = 100) by 126%, raising the ratio of declared profits to share capital from average 13% in the pre-war period to over 20% in the war and post-war years.[85]

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82. Military expenditure amounted to £E319m. between 1939-45 (out of which £E10m. were spent by American troops and the rest by British) distributed as follows:

1939	1940	1941	1942	1943	1944	1945
4.9	14.8	46.5	73.7	75.6	57.5	46.0

Source: C. Issawi, Egypt at Mid-Century, op.cit., p.230 and A.R. Prest, War Economies of Primary Producing Countries, Cambridge University Press, 1948, p.128.

83. "The main wartime demand on Egyptian manpower resources was the direct employment by the Allied Armies of general labourers for air fields construction, road building, railway extensions and dock and harbour work. A large number of skilled labourers were also employed as fitters turners and welders and carpenters on these works and in the many war department repair shops and depots. Others were employed as black-coated workers, drivers, mess orderlies, cooks and the like. All in all the peak figure for direct employment of these categories was about 200,000 in 1943, although it had declined to 150,000 by 1945". Prest, p.126. Issawi op. cit. estimates that 80,000, or 40%, were skilled or semi-skilled, pp.141-2.

84. P.K. O'Brien, The Revolution in Egypt's Economic System, Oxford 1966, p.17.

85. p.t.p.

Meanwhile the barriers to cotton exports and the imports of essential supplies of fertilizers lowered the profitability of investment in agriculture.[86] Under these circumstances, Egyptian merchants and landowners began to depart from their preference for investment in land and buildings and were prompted to invest in industry and even joined the rank of industrial entrepreneurs.[87]

Another institutional factor of some importance in developing wartime industry in Egypt (as well as several other countries of the Middle East) was the Middle East Supply Centre (M.E.S.C.)[88] The M.E.S.C. was established by British military command in Cairo in April 1941, and continued its function as a joint U.S.-U.K. undertaking from 1942 until September 1945. The Centre was charged with the task of mobilizing regional resources in order to reduce the dependence of Middle East countries on outside markets; imports had to be pruned: trade channels reoriented and local production intensified. As a result, local industries were utilized to full capacity for military and civil requirements and trade within the region increased sharply. The Centre was instrumental

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85. Year 1938 1939 1940 1941 1942 1943 1944 1945
Wholesale Price Index 1939=100 100 132 164 183 275 314 332
Net Company Profit Index 1938=100 100 102 142 172 201 229 234 226
Source: C. Issawi, Egypt at Mid-Century, op.cit., pp.161-2.

86. Average annual value of cotton exports declined from £E46m. in the 1920's to £E25m. in the 1930's and to £E20m. in 1939-45. Moreover, net value of agricultural output (at 1939 prices) declined from £E54m. in 1939 to £E44m. in 1945, M.A. Anis, A Study of the National Income of Egypt, l'Egypte Contemporaine, Nos.261-2, July 1959, p.685. Finally, the index of non-animal agricultural production (1935-39 = 100) declined to 86 in 1945, National Bank of Egypt, Economic Bulletin Vol. 7, 1954, p.252.

87. Egypt, Ministry of Industry, Committee of Industries' Report, Cairo 1948, (Arabic).

88. M.W. Wilmington, The Middle East Supply Centre, University of London Press Ltd. London 1971.

Table 5-17

The Expansion of Egyptian Industry During World War II

Commodity	Manufacturing capacity per annum	Remarks
Foodstuffs and allied products:		
Starch ...	2,600 tons	Increase of 1,600 tons
Glucose ...	2,000 tons (approx)	A new industry.
Vinegar ...	475,000 gallns	Fourfold increase (est.)
Yeast (for beer) ...	500 tons	Increase of 300 tons.
Beer ...	9,000,000 gllns	Increase from 1,585,000 gallons
Pasteurised milk and derivatives	15,000 tons	Increase from 4,000 tons
Cheese (all kinds) ...	1,200 tons (estimate)	Some increase
Rennet ...	120 tons	Practically new industry.
Preserved foods, jam, etc. including canning ...	20,000 tons	Increase from 400 tons.
Dehydrated onions and carrots	2,500 tons	New Industry.
Gelatine ...	2 tons	New Industry.
Sugar, refined ...	190,000 tons	Increase of 30,000 tons.
Chemicals.		
Aluminium sulphate ...	500 tons	Increase
Soap ...	60,000 tons	Increase 200%
Glycerine ...	800 tons	Increase from 50 tons
Stearic acid ...	2,000 tons	Considerable increase.
Caustic soda ...	5,800 tons	Increase from 4,000 tons.
Sodium silicate ...	2,000 tons	New industry.
Sulphuric acid ...	11,000 tons	Output doubled.
Super phosphate ...	16,000 tons	Increase from 4,000 tons. (approx).
Hydrochloric acid ...	450 tons	New industry.
Nitric acid ...	110 tons	New Industry
Sodium sulphate ...	1,000 tons	Some increase
Magnesium sulphate (crude)	900 tons	Some increase
Chromium sulphate ...	200 tons	New industry
Sodium carbonate ...	2,500tons	Increase from 450 tons a year due to new local deposits
Alcohol ...	8,000 tons	Estimated increase of 30 to 40%.
Acetic acid ...	12 tons	New industry
Sundry polishes ...	350 tons	some increase
Red lead and litharge ...	720	New industry
Carbon bisulphide ...	70 tons	New industry
Calcium carbide ...	360 tons	New industry
Bleaching solution (sodium hypochlorite)	-	New industry due to electrolytic plants operating to produce the equivalent of 300 tons per year of bleaching powder previously imported.

Copper sulphate ...	600 tons	New industry present output 200 tons a year (approx.)
Battery acid ...	800 tons	New industry
Sulphur (low grade) ...	400 tons	New industry present output 60-70 tons a year refined.
Acetone, ethyl acetate ...	---	New industries
Potassium and bichcornate	---	
Citric acid		
Ammonia ...	48 tons	Produced intermittently on small scale at high cost.
Liquid ammonia ...	100 tons	
Ether ...	50 tons	New industry
Turkey red oil ...	100 tons	New industry
Cotton industry		
Yarn ...	30,000 tons	An increase from 20,000 tons. The estimated potential outputs are 38,000 tons a year spinning, and 45/50,000 tons a year weaving, if all plants were fully operated. Outputs reduced by lack of spare parts.
which is made into piece goods (shirting, prints, drills, twills, ducks, furnishing fabrucs, pacquard cloths) mosquito nets, canvas and sewing threads ...	28,000 tons	
Knitted goods ...	2,000 tons	
Silk industry		
Silk and rayon weaving for stockings, underwear, dress fabrics furniture fabrics (rayon and cotton) ...	400 tons	Potential output 2,000 tons a year approx., partly converted over to cotton temporarily owing to lack of silk and rayon.
Woollen industry		
Yarn, knitted goods, suiting, fezzes	1,600 tons	Some increase, spinning capacity 1,600 tons a year; weaving potential 2,000 tons
Blankets ...	700 tons	
Flax industry		
Yarn manufactured into sewing threads, hose, tubular fabrics, canvas and webbing. ...	30/40 tons	Potential 60 tons a year if plant fully operated.
Cordage		
Sisal ropes and twine ...	12,000 tons	New industry
Jute, ropes, twine and sacks	3,000 tons	New industry- present output 2,000 tons a year.
Oil seed pressing ...	750,000 tons (cotton seed)	Increase from 40,000 tons
	8,200 tons (groundnat and linseed)	Increased from 8,000 tons. Re-opening of existing plants rather than increase in potential capacity. Corresponding increase in cotton seed cake production.

Copper (ingots, wire, cars, sheets)	2,000 tons	Present output 1,300 tons
Lead ...	3,000 tons	New industry; ore and scrap refining, Present output 1,500 tons a year.
Ferro-alloys ...	150 tons	New industry
Tin ...	30 tons	New industry
Asbestos ...	600 tons	New industry (potential output)
Primus stoves and parts ...	30,000 tons pieces	New industry
Cooking stoves (low pressure)		New industry
Single wick ...	20,000 pieces	12,000 a year
Oil heating stoves ...	5,000 pieces	New industries. Present output 2,500 a year.
High pressure cast iron water pipes	210,000 yards	New industry
Glassware ...	12,000 tons	An increase from 2,000 tons approx.)
Copper and iron rivets, small size	120 tons	Some increase
Dry batteries ...	1,500,000 units (units of 1.5 volts)	New industry. Present output 1,300,000 units.
Paper and cardboard ...	30,000 tons	Increase from 12,000 tons Two new plants.
Cardboard oil containers	6,000,000 units	New industry
Crown corks ...	4,500 cases of 100 gross	New industry
Corks (paper) ...	2,500,000 units	New industry
Refractory bricks ...	15,000,000 bricks	New industry
Crockery ...	5,000,000 pieces	Considerable increase and improved quality.
File reconditioning ...	1,000,000 pieces	New industry.
Steelcasting ...	800 tons	New industry - producing 300 tons a year.
Lead tubes (collapsible)	2,000,000 units	New industry
Cigarette lighters ...	500/600,000	New industry, but output actually much lower and in accordance with demandas it arises.
Hollow-ware ...	600 tons	Additional factory. Increase of 200 tons a year
Paint production ...		Considerable increase, but no figures available of low-grade paints mainly from local raw materials.
Printing inks ...	60 tons	Increase from 10 tons.
Cement ...	425,000 tons	Increase from 365,000 tons.
Matches ...	450,000,000	Two new factories, but present total production about 265,000,000 owing to wood shortage and this is roughly the pre-war production.
Dolls and toys ...	£E5,000 in value	New type of product.
Laundry pegs ...	£E14,000 in value	New type of product.
Pens, rulers, triangles etc.	£E5,000 in value	New type of product.
Cosmetics) Pharmaceuticals)	No statistics, but production believed to have increased.	

in providing technical advice to factory managers, helping them to deal with bottlenecks, and to procure raw materials and spare parts.[89] The output of textiles, processed food, chemicals, glass, leather, cement, and other building materials, petroleum and mechanical industries expanded considerably while new industries were established such as the dehydration and canning of vegetables, rubber products, jute processing, the making of spare parts and tools, and, above all, a wide variety of chemical and pharmaceutical products. Table 5-17, reproduced from the 1945 Overseas Economic Surveys: Egypt, sums up the effect of the war on the growth and diversification of Egyptian industry.[90] This unique source on war time development shows clearly how the capacity of existing industries was fully utilized and new industries sprang up to satisfy increasing demand. "There is no doubt that, had supply of machinery been possible, the wartime development of Egyptian industry in general would have been much greater".[91]

According to Anis, industrial output increased by about 38% between 1939 and 1945, while agricultural output declined by about 20% during the same period.

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89. Ibid., pp.103-139.

90. Great Britain, Board of Trade, Overseas Economic Surveys: Egypt, 1945, London, H.M.S.O., May 1945.

91. Anis, op.cit., p.782.

(£Em)

Year	1939	1940	1941	1942	1943	1944	1945
Value added in industry (1939 prices)	13.0	15.0	18.3	19.6	19.6	20.0	18.0
Value added in agriculture (1939 prices)	54.1	49.4	47.0	40.2	39.0	42.8	43.6

Source: Anis, A Study of the National Income of Egypt, op.cit., pp.19-30 and B. Hansen and D. Mead, The National Income of the U.A.R. (Egypt) 1939-62, Institute of National Planning, Memo No. 355, Cairo, 1963, pp.234-6.

The beginning of structural transformation of the economy is indicated by the increase in the share of manufacturing in G.D.P. from 8% in 1939 to about 12% in 1945 and the decline of that of agriculture from about 50% to 45% during the same period.[92]

This growth of industrial output which was not accompanied, as our series shows, by net investment, was achieved in two ways; first, by more intensive use of the existing C.S. in modern industry, and second the proliferation of small workshops. Population Censuses show that employment in industrial occupations increased from 345 to 553 thousands or by 60% between 1937 and 1947, more than both the preceding and succeeding years. "Employment rose because the very unusual demand conditions of the war years produced a situation where thousands of small-scale handicraft producers could survive and prosper alongside their capital-intensive rivals, who deprived of possibilities for importing machinery could only expand production up to capacity output".[93]

The opposite movement of output and capital during the war illustrates the limitation of using C.S. series in isolation as an index of growth. However, an increase in output resulting

92. Hansen and Mead, The National Income of the U.A.R.(Egypt), op.cit., p.234-6.

93. O'Brien, The Revolution in Egypt's Economic System, op.cit., p.18.

from a fuller utilization of capacity and an expansion of small handicrafts cannot maintain its momentum for a long time. Sooner or later capital has to be replaced. Capital accumulation is a necessary condition of long-term growth.

Though the war interrupted the mild upswing in C.F. of the 1920's and 1930's, it also created favourable conditions for a new spurt of industrialization and played a crucial role in bringing about the postwar upswing. Coming after the Great Depression, it strengthened the belief in the importance of diversification. More significantly, it educated entrepreneurs who had a chance to explore markets and discover the scope for new industries for which demand existed. The large number of workers employed by the Allied forces and those recruited by expanding industries during the War created a large pool of trained and skilled labour. Firms accumulated profits and the country a huge balance of foreign exchange estimated at £E450m.[94] The war precipitated the change in institutions and attitudes which began in the 1920's and 1930's and provided the objective conditions - skilled labour, capital, information about markets and opportunities for learning by doing in small workshops or under the supervision of military technicians for both an immediate increase in industrial output and an investment spurt thereafter.

5.2.5 1945-1967

In contrast to the war years this period represents a distinct upswing in the rate of C.F. Average annual rate of growth of C.S. amounted to 5.29% as compared with 3.92% for 1920-39 and the negative rate during the war. Industrial output also grew rapidly [Table 5-18]. There is a close

94. Issawi, Egypt at Mid-Century, op.cit., pp.141-3.

resemblance between the average rates of growth of output and capital (they amounted to 5.3% and 5.9% respectively) but the year-to-year movements diverged as factors other than capital affected output. Our capital series shows a continuous, though uneven, growth in C.S. throughout the period. One interesting feature of these years is that high rates of accumulation obtained under very different institutional set-ups. The short-term ups and downs often reflect the immediate impact of external factors (such as the Suez War, 1956, and the June 1967 War) or an adverse domestic event (failure of cotton crop, 1961, and the foreign exchange crisis in the mid-1960's).

The spurt in the six years following the war, 1945-52, during which the annual average rate of growth of C.S. was 10.3% reflects post-war reconstruction and expansion. A variety of factors helped to promote this rate.

First of all domestic industry continued to enjoy a good part of the home market for a long time after the war as foreign substitutes were limited at a time when bent-up demand in the local market was sufficiently high to maintain, or in some cases raise, output. Secondly, accumulated war profits in search for investment opportunities found in industry an attractive prospect. Furthermore, prices continued to rise as a result of increased value of cotton exports, the unprecedented expansion of domestic investment, and the failure of Government measures to check inflation due, among other reasons, to the resistance of the powerful industrialists, merchants and landlords, who were the main beneficiaries of inflation. Consequently, the official wholesale price index (1939 = 100) which had fallen from 333 in 1945 to 307 in 1947 rose again to 332 in 1948 and 386 in 1951. Industrial entrepreneurs responded by replacing their obsolete and

TABLE 5-18

INDEX OF INDUSTRIAL PRODUCTION(1)
1952 = 100

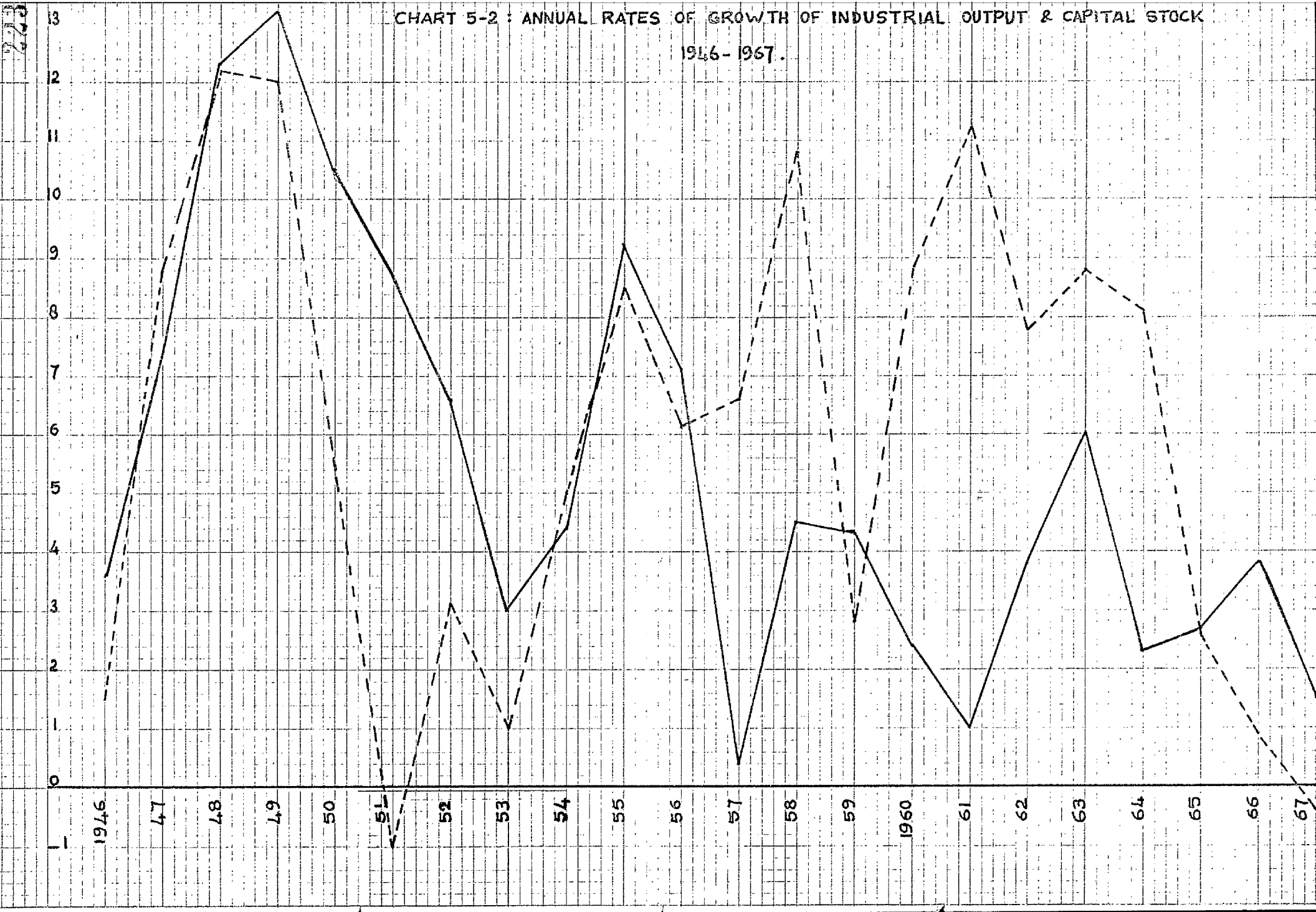
Year	Index	Annual Rate of Growth %	Year	Index	Annual Rate of Growth %
1939	49	--	1956	122	6.1
1945	67	5.3	1957	130	6.6
1946	68	1.5	1958	144	10.8
1947	74	8.8	1959	148	2.8
1948	83	12.2	1960	161	8.8
1949	93	12.0	1961	179	11.2
1950	98	5.4	1962	193	7.8
1951	97	-1.0	1963	210	8.8
1952	100	3.1	1964	227	8.1
1953	101	1.0	1965	233	2.6
1954	106	5.0	1966	235	0.9
1955	115	8.5	1967	234	-0.4

(1) Includes total industry and electricity.

Sources: From 1939 to 1945 the estimate is that of Anis, A Study of the National Income of Egypt, op.cit., p.685. The estimate is based on value added and employment figures. From 1945 to 1951 the estimate is made by the National Planning Committee, Memo No.1, Cairo, 1957. It is based on gross value added at fixed 1954 prices, and employment figures were used where output data were not available. As for 1951-59, figures are the National Bank of Egypt's Index of Industrial Production, Economic Bulletin, Vol.X, No.1, 1957. The index is a weighted geometric average of physical output, weights being net value added in 1950, and employment figures where no value added data are available. From 1959-67 figures are my own. They are based on value added at constant 1959/60 prices published by the Ministry of Planning, Development of National Economic Indicators During the 'Sixties: 1960/61-1969/70, Cairo, January, 1972.

This index suffers from a number of inaccuracies which are mainly due to using different sets of national accounting and physical output data, and the failure of the National Bank to include most of the new products. However, the index provides a satisfactory indicator of the growth of industrial output. On the limitations of the index see B. Hansen and G.A. Marzonk, Development and Economic Policy in the UAR (Egypt), Amsterdam, 1965, pp.116-8.

CHART 5-2 : ANNUAL RATES OF GROWTH OF INDUSTRIAL OUTPUT & CAPITAL STOCK 1946-1967.



depreciated equipment with new imported machinery. The share of capital-goods imports to total imports increased from 13% to 20% between 1945 and 1950,[95] even though it was difficult to import equipment to replace worn out machines overutilized during the war. A great part of Egypt's foreign exchange resources remained frozen in the accumulated sterling war balances. Britain was neither able to pay her debts in cash nor to deliver machinery in payment. Neither was she interested in doing this, since on one hand she had to export 150% as much as she did before the war to restore her pre-war standard of living, and on the other hand, "British circles were . . . very reluctant to deliver machinery to the newly created industries of the Near East in order to avoid strengthening competitors".[96] Even when the sterling assets problem was settled, repayment allotments were too small to allow any sizeable investment, and Egypt had to depend on her exports to replenish her productive capacity as the following table shows:[97]

Release of Sterling Balances

Year	1946	1947	1948	1949	1950	1951	1952	1953	1954
Released balances (£Em)	18.8	35.1	7.7	21.7	29.0	54.4	40.1	-3.7	2.2
Egypt's Imports of Producers' Goods (£Em)	49.4	65.1	101.6	112.0	133.5	163.9	160.2	119.7	108.1

S.H. Abdel-Rahman, A Study of the Foreign Trade of Egypt in the Postwar Period with Special Reference to its Impact on the National Economy, unpublished Ph.D. Thesis, Cairo University, 1959, Table 8.1, p.205.

95. Samir Radwan, Interrelations Between Industrial Development and Imports; Industrialization through Import Substitution in Egypt, 1945-1965, unpublished M.Sc. Dissertation, University of London, 1967, Table 2, p.22.

96. B.D. Weinryb, "Industrial Development in the Near East", Quarterly Journal of Economics, Vol.61, May 1947, p.496.

97. S.H. Abdel-Rahman, A Study of the Foreign Trade of Egypt in the Postwar Period with Special Reference to its Impact on

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But by 1949 foreign competition began to affect sales from industry; stocks accumulated; prices fell; working hours were reduced and some factories had to close down.[98] The crisis was only mitigated by measures taken by the Government such as the increase in tariffs, rebates on state railways, preference in Government contracts, subsidies to certain industries, and the establishment, in 1949, of the Industrial Bank to extend credit to depressed industries and encourage new ones.[99]

The Korean boom of 1950-51 (another external factor) helped Egyptian industry to recover by raising the price of cotton and with it internal purchasing power and by reducing foreign competition. By the end of 1951, however, both these stimuli had spent their force, and several Egyptian industries, notably textiles and construction, were once more facing difficulties. The depression following the Korean boom coincided with a year of great political instability and was soon followed by the 1952 Revolution. It is remarkable that despite all these factors the fall in the rates of capital accumulation in 1952 and 1953, although significant, were not very considerable.

The year 1952, though extremely important politically, does not mark a turning point from the economic point of view. The first four years of the Revolution (1952-56) may actually

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the National Economy, unpublished Ph.D. Thesis, Cairo University, 1959, Table 8.1, p.205.

98. C. Issawi, Egypt at Mid-Century, op.cit., p.142.

99. The Industrial Bank was established in 1949 with the Government holding 51% of its capital of £E1.5m., guaranteeing a 3.5% dividend on share capital as well as the principal and interest on debentures up to 5 times the capital, and is authorized to advance loans up to £E2m. for working capital. Egypt, Industrial Bank, The Development of Industrial Credit in Egypt, Cairo 1956.

be regarded as a continuation of the postwar economic system which was essentially dominated by private enterprise. Indeed great encouragement was given during those years to private enterprise; national and foreign.[100]

To stress continuity, however, should not overshadow changes that were taking place in attitudes, policies and institutions and were to affect future development. Elements of change were perhaps most evident in the government's industrial policy. The Officers' acceptance of the case for rapid industrialization and their awareness of the need for the structure of industry to be diversified, was a clear departure from the "agrarian mentality" that characterized Egypt's ruling circles since the collapse of Mohamed Ali's system (1840's).[101]

During this period, the government's policy, devised in close cooperation with the Federation of Egyptian Industries, representative of national capitalists, aimed at creating a more favourable climate for industry. A number of laws were passed allowing foreign investors to have a majority control of companies operating in Egypt (instead of only 49% of the shares as stipulated in law 138 or 1947), and making easier the repatriation of profits and capital.[102] However, foreign capital, under conditions of political uncertainty, was not easy to attract.[103]

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100. For a comprehensive survey of the development in policies and institutions in the different stages of the 1952 Revolution, see P.K. O'Brien, The Revolution in Egypt's Economic System, op.cit., Chapters III-VII.

101. Ibid., p.83-4.

102. Laws no. 156 of 1953, and 26 and 475 of 1954; National Bank of Egypt, Economic Bulletin No1, 1953 and Nos. 2 and 3, 1954.

103. The contribution of private foreign capital was limited to oil prospecting by 4 companies, and the formation in 1954 of the Egyptian Iron and Steel Co. at Helwan by participation with Bank Misr., the Industrial Bank, and DEMAG of Germany. Moreover, a programme of aid from U.S. started by providing, in Nov. 1954, a $40m. grant to finance

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To encourage domestic investment in industry, the Government reformed the tariff system by raising duties on competing manufactured goods and abolishing or reducing them on raw materials and equipment. Exemption from taxes on profits was granted, for seven years, to new companies considered essential to promote economic development, for 5 years to existing companies, which increased their capital, and taxation on undistributed profits reduced by 50%. The government raised its guarantee of loans by the Industrial Bank to £5m., participated in covering new issues and guaranteed loans made by commercial banks to industrialists. A fund to promote the marketing of cotton textiles was created, membership in industrial chambers became compulsory for all establishments with a capital of £E10,000 or over, and additional controls introduced to protect workers and shareholders and restrict the privileges of directors.[104]

A novel feature of this period, however, was the direct participation of the State in promoting and running several pioneer industrial projects of a heavy or basic type. As early as 1952 an important institution, The Permanent Council for the Development of National Production, was established in order to "study and promote new projects that aim at the development of the national economy".[105] On the recommendation of the Council, the government contributed in 1954 half the capital for the Iron and Steel Plant at Helwan. In 1955 more than 50% of the capital required for a railway equipment

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certain projects in irrigation and transport; The Permanent Council for the Development of National Production, 1955 Report, Cairo 1955.

104. Ibid., pp.442-58.

105. Ibid., p.402.

company was jointly provided by the Egyptian State Railways (20%), the Permanent Council (15%) and the Industrial Bank (13%).[106] The Permanent Council financed in large part a fertilizer and a cement plant and provided various incentives to other firms.[107]

Thus the continuity of the upswing in industrial investment in 1952-56, despite the political changes which perhaps inhibited private investment, was due to the active support given by Government.

After the Suez Crisis (1956-57) Government intervention was extended both in range and intensity. The government moved away from the previous policy of developing the economy through the encouragement of private investment in favour of higher rates of public investment, the greater part of which was allocated to ambitious projects designed to accelerate the growth of industry.[108]

The National Planning Committee (N.P.C.) began in 1957 to "prepare a long-term plan for social and economic development which would mobilize public and private effort" scheduled to start in 1960.[109] Meanwhile, the newly formed Ministry of Industry (June, 1956) had prepared the First 5-Year Industrial Plan covering the period (1957-61). This Plan aimed to increase the annual rate of growth of industrial

106. Ibid., pp.198-200.

107. The Permanent Council for the Development of National Production, 1954 Report, Cairo 1954, p.14.

108. O'Brien, The Revolution in Egypt's Economic System, op.cit., p.100.

109. F. Dolp and D. Breebart, "Evolution of Planning Organization in the U.A.R. (Egypt", in Journal of Development Studies, Vol. 3, No. 4, July 1967, pp.380-82.

production from about 6% to 16% per annum, thereby raising the share of the industrial sector in GNP from 11% to 19% in five years. The plan also sought to raise employment in industry by 120,000 workers and diminish the pressure on the balance of payments by substituting domestic products of consumer goods for imports. To achieve these ambitious aims £E330m. were to be invested in 150 projects.[110] By the end of 1960, only after 3 years, actual investments amounted to £E142m., i.e. 43% of the planned amount. Only £E83.5m. were invested in 105 completed projects concentrated mainly in the fields of mining, textiles, food processing and consumer durables. The remaining £E58m. were invested in uncompleted projects which had to be incorporated into the general 5-Year Plan.[111]

One of the main weaknesses of the Industrialization Programme was its failure to specify the source of finance. Apparently it was planned that 61% of the finance would be provided from public sources, for projects mainly in heavy industries, leaving light and more immediately profitable manufacturing to private investment. However, the private sector was not likely to respond. Most investors, apparently preferred to place their money in real estate.[112] The share of buildings in total C.F. amounted to 33% on average over the period 1952-1958.[113]

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110. Egypt, Ministry of Industry, Industry after the Revolution and the 5-Year Plan, Cairo 1957.

111. For a detailed list of projects see Ministry of Industry, Programmes of Industrialization, Cairo 1961, pp.12-15.

112. O'Brien, The Revolution in Egypt's Economic System, op.cit., p.87.

113. Department of Statistics and Census, Ten Years of Revolution: Statistical Atlas, Cairo, July 1962, Table 11.

The government was convinced that a higher rate of industrial growth could only be achieved by a closer control over the savings of the organized sector which accounted for about 50% of total savings.[114] The highly concentrated nature of Egyptian industry made it amenable to government control. The two giant monopolies that dominated the private sector, the Misr and Abboud groups, were impelled to participate in the industrial programme.[115] In fact, the Misr complex, with a long tradition of cooperation with the State, was instrumental in launching and financing the development projects recommended by the Permanent Council. It was estimated that the Misr Group were made responsible for nearly 50% of the investments undertaken by private enterprise as part of the Industrial Programme.[116]

Another important instrument of the government's economic policy was the Economic Organization (E.O.). Established in 1957, the E.O. was empowered to take over government interests in various joint-stock companies, to acquire the capital or public enterprises, and to participate in and promote new enterprises. During its brief existence of four years (1957-61), the E.O. had become the most important government agency for promoting industrial expansion. Investment of the organization in industrial companies amounted to £E38m. in 1957, and grew to £E49m. in 1960. By 1961 the E.O. controlled an important complex of industrial enterprises in the fields

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114. O'Brien, op.cit., pp.87-8.

115. We dealt earlier with the Misr group, as for the Abboud Group, it was mainly made up of the Khedivial Mail lines, the Egyptian Sugar Co., the Suez Fertilizer Co. and several other textile mills.

116. Anouar Abdel Malek, Egypt: Military Society, New York, 1968, p.113.

of steel, minerals, chemicals, and textiles, which accounted for about 30% of total output and 20% of employment in the organized industrial sector.[117]

Moreover, the government was in a position to influence the allocation of credit by the local banks. By 1958 and as a result of the Egyptianization the State, through the E.O., controlled all specialist banks in Egypt, 7 commercial banks whose loans represented about 50% of total lending by commercial banks, and 5 insurance companies, whose activities accounted for more than 68% of such business in the country.[118] Finally, the government's control over the banking system as a result of the nationalization of leading banks between 1957 and 1960, enabled it to influence credit allocation.

By 1960 the Egyptian government "had attained a position where investment could be planned".[119] In July of that year, Egypt launched her first 5-year plan for economic and social development, which was the first stage in a 10-year plan aiming at "doubling the national income within a time limit of ten years". The primary objective of the 5-year plan was to increase national income by 40% over the period 1960-65, which corresponds to an average annual rate of growth of 7%, and a rate of growth per capita of 4-4.5%. This was to be achieved principally by speeding up the growth of the industrial sector to about 15% and agricultural sector to 5% as compared with only 6 and 2.5% growth rates for the pre-plan period 1952/53-1959/60. The plan laid down an investment programme amounting to £E1636m. over the five years which implied an

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117. The Economic Organization, Yearbook, 1958-59, Cairo 1959, and Al-Ahram Al-Iktisady, No. 140, Cairo, 15.VI.1961.

118. O'Brien, op.cit., p.93-6.

119. Ibid., p.96.

increase in the investment ratio from 12.5% in the base year 1959/60 to slightly over 20% during the plan. The plan was rather optimistic in assuring that domestic savings, expected to increase from 13 to 20% of GNP during the plan, would finance two-thirds of investments, and only one-third to be covered by foreign sources. The plan was also unrealistic in expecting that import substitution would work rapidly enough that by the end of the plan a surplus of £E40m. should have been obtained in the balance of current payments.[120]

It was intended in the plan that the majority of investment (about 90%) was to be made by public authorities on the assumption that the rest would be realised automatically through the reaction of the private sector. The performance during the first year of the plan proved that this was not the case. Actual investments fell 25% short of the target. The Egyptian government came to realise the difficulty of comprehensively planning an economy with a relatively small public sector and where at least two-thirds of national production took place outside its immediate control.[121] It is here that the massive nationalizations of 1961-63 find their justifications.[122] Apart from the socio-political and ideological considerations regarding public ownership as the basis of the "Socialist Transformation", the motivation behind the nationalization measures, from an economic point of view, seems to have been the government's drive to control the level and allocation of domestic savings.

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120. U.A.R., N.P.C., General Frame of the 5-Year Plan for Economic and Social Development; July 1960-June 1965, Cairo 1960.

121. U.A.R., Ministry of Planning, Follow-up and Appraisal of the First 5-Year Plan (1960/61-1964/65), Cairo, Feb.1966 (Arabic).

122. Hansen and Marzonk, Development and Economic Policy in the U.A.R. (Egypt), op.cit., pp.167-71.

Thus, after one decade of the Revolution, and as a result of the "Socialist Laws", Egypt's economic system came to be dominated by an important public sector. The following indicators, however rough, help to illustrate this profound transformation. The share of the public sector in total output increased from 15% to 35% between 1953 and 1962/63, and by the latter year, it controlled 45% of domestic savings and was responsible for 90% of G.D.C.F.[123]

Despite such difficulties as the cotton crop failure in 1961, the Yemen war of 1962 and foreign exchange crises, the 5-year plan period was one of impressive progress. Between 1959/60-1964/65, the average growth rate of GDP amounted to 5.5-6% which corresponds to an annual rate of growth per capita of about 3%. While this seems to have been close to the 7% envisaged by the plan, the development of various sectors differed significantly. While the plan targets were surpassed in electricity, construction and transport, there was a shortfall in the two commodity sectors, agriculture and industry.[124] The main cause for the shortfall sectors seems to be a shortfall of investments. Total investment amounted to £E1513m. or 92.5% of the £E1636m. envisaged by the plan. Actual investment in industry (including electricity) were probably 20-25% short of the target.[125] The behaviour of imports departed radically from the plan. The plan foresaw a slight decline in imports (6%) with import substitution working so rapidly that the increase in investment goods' imports were to be more than offset by the declining

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123. Figures for 1953 from O'Brien, op.cit., p.154, and for 1962/3; Ministry of Planning, Follow-Up and Appraisal of the 5-Year Plan, op.cit., pp.90-108.

124. Ibid., p.38.

125. Ibid., p.90.

imports of consumer and intermediate goods. In actual fact the value of imports increased by 77.4% during the plan.[126] The divergence could be explained by the failure of the agricultural sector to grow as planned resulting in a heavy dependence on imported foodstuffs, as well as a rise in capital and intermediate goods needed for the growing industrial sector. Stagnation of exports together with the vast increase in imports made it impossible to achieve the planned balance of payments surplus of 2% of GDP. Instead a deficit of about 5% of GDP persisted during the plan period.[127]

Thus the sustained rate of growth of industrial capital between 1957 and 1965 resulted mainly from direct government involvement in the management of the economy. The Government came to control an increasing share of the industrial sector and to design and implement specific programmes of investment. By 1962 the Government was practically the sole owner of the "modern" industrial sector and had attained the control over its savings and investment.

An important feature of economic development during these years was the increasing dependence on foreign resources for the finance of C.F. Table 5-19 shows that net foreign indebtedness provided 8.8% of total investment finance in 1952/53-1959/60 and this share increased to 23.6% in 1960/61-1967/68.

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126. Ibid, pp.121-4.

127. For an excellent analysis of the balance of payments problems during the plan see Fouad Mursi, "Basic Observations on the Balance of Payments Deficit", L'Egypte Contemporaine, No. 333, Cairo, July 1968, pp.503-524.

Table 5-19

Finance of Domestic Investment, 1952/53-1967/68
(at Current Prices)

£E million

Year	Gross Domestic Investment £Em	Domestic Savings £E.m	Domestic Savings % to Investment	Balance of Payments Deficit £E.m	Balance of Payments Deficit % to Investment
1952-53	118.6	103.3	87.1	15.3	12.9
53-54	132.4	131.9	99.6	0.5	0.4
54-55	146.2	119.1	81.5	27.1	18.5
55-56	172.1	159.4	92.6	12.7	7.4
56-57	151.0	154.6	101.1	-1.6	-1.1
57-58	165.4	145.8	88.1	19.6	11.9
58-59	181.4	141.1	77.8	40.3	22.2
59-60	171.4	175.9	102.6	-4.5	-2.6
Average 1952/53-59/60	154.8	141.4	91.2	13.7	8.8
1960-61	225.6	210.1	93.1	15.5	6.9
61-62	251.1	164.7	65.6	86.4	34.8
62-63	299.6	195.4	65.2	104.2	34.8
63-64	372.4	236.8	63.6	135.6	36.4
64-65	281.7	307.2	80.5	74.5	19.5
65-66	446.2	309.6	69.4	136.6	30.6
66-67	385.6	370.7	96.1	14.9	3.9
67-68	342.2	270.9	79.2	71.3	20.8
Average 1960/61-67/68	338.1	258.2	76.4	79.9	23.6

Sources: 1952/53-1958/59; Ministry of Planning, Indicators of Economic Development in the U.A.R. from the Revolution to the End of the First 5-Year Plan (1952/53-1964/65), Cairo, 1966, and
1959/60-67/68; C.A.P.M.S., Changes in the National Economic Indicators During the 1960's, 1960/61-1969/70, Cairo, 1972, pp.23-4.

Thus in the 1960's the economy became extremely vulnerable to the constraining influence of foreign exchange. The cotton crop failure of 1961, for example, adversely affected both the rate of growth of GDP (3.5 % compared with an average of 6% per annum during the plan) and C.F. in industry (0.1% against an average of 5.29% during the postwar upswing). These strains cumulated and were aggravated by the withdrawal of U.S.A. aid in 1964 so that by the end of the 5-Year plan there was a pronounced drop in the rate of growth of industrial production from 8.1% in 1964 to 2.6%, 0.9% in 1965 and 1966 respectively.[128] The rate of growth of GDP fell from 4.5% in 1965/66 to 0.7% in 1966/67 which resulted, given the high rate of population growth (2.9%), in the low (1.7% in 1965/66) and even negative (-2.2% in 1966/67) rate of growth of GDP per capita.[129] Under the pressure of a persistent deficit in the balance of payments which increased from £E75m. in 1964/65 to £E137m. in 1965/66, the government had to cut down investment. Gross investment decreased from £E364m. (17.7% of GNP) to £E298m. (11.9% of GNP) between 1964/65 and 1967/68. This decline in investment was more apparent in the commodity sector where investment in agriculture decreased from £E89m. to £E62.5m. and in industry from £E100m. to £E86m. between 1964/65 and 1967/68.[130] The effect of this decline in the level of investment on the immediate growth of the economy should not be exaggerated. In fact it gave the country a chance to dispense with the

128. See Table 5-18.

129. U.A.R. Ministry of Planning, Follow-Up and Appraisal of Economic Growth in the U.A.R. for the Year 1966/67, Cairo, Aug. 1968 pp.66-71.

130. U.A.R., G.A.G.M.S., U.A.R. Economic Indicators, 1961-69, Cairo, July 1970, p.10.

accumulated stocks, especially in manufactured consumer durables, and to start using a part of its enormous excess capacity (estimated at 30% during the 1960's).[131] But, the more alarming aspect of the decline in C.F. can be envisaged in terms of its effect on the long-run growth especially in a country where increased investment, rather than labour productivity, is the main source of growth. Unfortunately, the Arab-Israeli war of 1967 aggravated this situation as a growing share of GNP (25%) has to be spent on defence and a lesser share (12%) on GFCF.[132]

It is important at this point to study the structural changes in the industrial sector between 1945 and 1967 to determine the degree of transformation and diversification that took place during this period. Data does not enable us to analyse the structure of C.S. by type of industry and disaggregated investment figures for industry are not available except for the first Industrial Programme (1957-60) and the Five-Year Plan (1960-65). Output and employment data will be used to assess the structural transformation.

In Table 5.20 value added is disaggregated by industries for selected years. The Census of Industrial Production covering establishments engaging ten persons and more is taken at two-year intervals from 1952 to 1956 and then annually up to 1966/67. The earlier censuses (1944, 1947 and 1950) are not comparable with this series due to differences in concepts, coverage and reliability. The years selected for comparison

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131. Stocks of manufactured products decreased from 12% of value added in industry in 1965/6 to 4.6% in 1966/7; Ministry of Planning, Follow-Up.... for the Year 1966/67, op.cit., pp.148 and 229.

132. S.A. El-Bawab, Production, Consumption and Investment in the War and Development Economies, Institute of Banking Studies, No. 8, Cairo, 1968-69.

Table 5.20

Value Added in Manufacturing by Major Group*
(Establishments Engaging 10 persons and More)

Industries	1952 £E.m	1952 %	1957 £E.m	1957 %	1960 £E.m	1960 %	1964/5 £E.m	1964/5 %	1966/7 £E.m	1966/7 %
I. Consumer Goods	52.1	69.80	66.2	70.30	87.0	68.40	109.3	58.00	169.1	63.00
20. Food	13.6	18.20	13.9	14.75	23.6	18.55	24.0	12.74	29.6	11.03
21. Beverages	3.1	4.16	2.2	2.33	3.3	2.59	4.8	2.55	3.4	1.27
22. Tobacco	5.5	7.37	4.3	4.56	8.8	6.92	5.3	2.81	13.4	4.99
23. Textile	24.7	33.12	38.9	41.29	42.3	33.25	61.5	32.64	107.5	40.05
24. Wearing Apparel	1.4	1.88	1.1	1.17	1.5	1.18	3.1	1.65	3.6	1.34
26. Furniture	1.0	1.34	1.8	1.91	1.7	1.34	2.6	1.38	2.4	0.89
28. Printing	2.1	2.81	2.9	3.08	3.1	2.44	3.4	1.80	5.6	2.09
29. Leather	0.4	0.54	0.8	0.85	0.6	0.47	0.9	0.48	1.0	0.37
30. Rubber	0.3	0.40	0.3	0.32	2.1	1.65	3.7	1.96	2.6	0.97
II. Intermediate Goods	18.8	25.20	24.8	26.20	34.4	27.10	60.6	32.20	79.5	29.60
25. Wood	0.2	0.27	0.3	0.32	0.2	0.16	0.8	0.42	0.9	0.33
27. Paper	1.0	1.34	1.6	1.70	2.5	1.97	5.8	3.08	7.3	2.72
31. Chemicals	5.5	7.37	7.4	7.85	14.6	11.48	25.9	13.75	32.0	11.92
32. Coal & Petroleum	6.4	8.58	5.5	5.84	1.5	1.18	6.3	3.34	10.3	3.84
33. Non-Metallic Products	3.2	4.29	4.9	5.10	7.4	5.85	9.2	4.88	10.7	3.99
34. Basic Metals	1.2	1.61	3.1	3.29	6.4	5.03	7.6	4.03	9.5	3.54
35. Metallic Products	1.3	1.74	2.0	2.12	1.8	1.42	5.0	2.65	8.8	3.28
III. Capital Goods	7.8	3.80	2.2	2.30	4.5	3.50	15.6	8.30	16.6	6.20
36. Machinery (Non-Electric)	0.2	0.28	0.3	0.32	0.6	0.47	3.2	1.70	2.9	1.08
37. Electrical Machinery	0.3	0.40	0.6	0.64	1.4	1.10	5.1	2.71	8.8	3.28
38. Transport Equipment	2.3	3.08	1.3	1.38	2.5	1.97	7.3	3.87	4.9	1.19
IV. Miscellaneous	0.9	1.20	1.0	1.20	1.3	1.02	2.9	1.50	3.2	1.20
TOTAL	74.6	100.00	94.2	100.00	127.2	100.00	188.4	100.00	268.4	100.00

Source: Department of Statistics and Census, Census of Industrial Production, 1952, 1957, 1960, 1964/5 and 1966/7.

* Consumer goods include code no. 20-24, 26, 28-30. Intermediate: 25-27 and 31-35. Capital: 36-38. This is the best approxiation that could be achieved given the limitation of available data.

have been chosen to correspond with significant dates in this period. Value added data is also grouped in three broad categories; consumer, intermediate and capital-goods industries.

Changes in the industrial structure are not very significant between 1952 and 1957. The share of consumer, intermediate and capital goods are very similar in those years. Egyptian industry was predominantly oriented towards consumer goods (70%) and the production of machinery and transport equipment was insignificantly small (about 3% including repairs). These aggregate data mask, however, the emergence of new industries. Though their quantitative impact on the structure of value added was relatively small at first, they were significant for future development. Nitrogen fertilizers were produced for the first time in Egypt at the beginning of the 1950's by the Suez Fertilizers Co. founded in 1946, the construction of the Helwan Iron and Steel plant began in 1954, and the production of rubber tyres started in the mid-1950's. In fact certain new industries such as rayon, plastics, copper and aluminium wear, and a variety of chemical and pharmaceutical products, sprang up immediately after World War II. The diversification of industrial output which began in the late 1930's (paper, matches, etc.) and, despite difficult conditions, continued during the war (nitric and hydrochloric acids, cooper sulphate, asbestos, cast-iron pipes, etc.) was further pursued after 1946.

Changes in the structure of value added are much more pronounced between 1960 and 1964/5 than between 1957 and 1960 when increases in the shares of intermediate and capital goods were relatively small. The significance of the 1957-60 period, however, appears more clearly from an analysis of the allocation of investment in the first Industrialization Programme [Table

5-21_7. Some 35.5% of investment in completed projects was in "basic metals", all intermediate goods 55% and "machinery and transport equipment" 8.4%. Traditional consumer goods, such as food and textiles, represented slightly more than one-third of total investment, in contrast to their relative importance in output. It seems that investments under the first Industrialization Programme were instrumental in bringing about the structural transformation revealed by value added data for 1964/5.

The pattern of investment during the Five-Year Plan (1960-65) is different in a number of respects. While the share of investment in intermediate goods industries remained almost constant, that of consumer goods declined further and capital goods increased by 3 percentage points. The distribution of investment within each category differed significantly between the Industrial Programme and the Plan /Table 5-21_7. The share of "basic metals" within intermediate goods declined substantially to the benefit of "chemicals" and "petroleum". Investment in consumer goods, which was almost exclusively concentrated in textiles in one instance, is more equally divided between food and textilee in the other.

The extent of diversification in industrial output during the period 1957-65 is indicated by the range of new products. A variety of consumer durables are now assembled or manufactured in Egypt; cars, bicycles, television sets, washing machines, water heaters, air coolers and sewing machines. Similar expansion took place in chemical products especially fertilizers, pharmaceuticals and paints and dyes. The output mix of these industries has become much more diverse.[133]

133. C.A.G.M.S., Directory of Commodities Manufactured in the U.A.R., Ref. No. D-671133, Cairo, March, 1967.

Table 5.21

Gross Domestic Investment in Manufacturing
(Current Prices)

Industries	1957-60 £E'000	%	1960-65 £E'000	%
I. Consumer Goods	27,959	36.1	98,600	29.9
Food, Beverages and Tobacco	859	1.1	39,400	12.0
Textile	27,100	35.0	54,600	16.5
Leather	-	-	400	0.1
Printing and Publishing	-	-	4,200	1.3
II. Intermediate Goods	42,489	55.0	159,400	48.3
Wood	429	0.6	600	0.2
Chemicals, Paper and Rubber	7,078	9.2	64,100	19.4
Coal and Petroleum	3,638	4.7	52,200	15.8
Non.Metallic Products	3,227	4.2	3,500	1.1
Basic Metals	27,500	35.5	32,400	9.8
Metallic Products	617	0.8	6,600	2.0
III. Capital Goods	6,848	8.9	37,800	11.4
Machinery (Non-Electric)	1,349	1.7	8,700	2.6
Electrical Machinery	1,671	2.2	9,700	2.9
Tranport Equipment	3,528	4.6	15,700	4.8
IV. Vocational & Training	300	0.4	3,700	1.1
V. Miscellaneous	-	-	34,400	10.4
TOTAL	77,331	100.0	330,200	100.0

Source: 1957-60: Figures represent actual investment in completed projects of the Industrialization Programme. Total figure is £E38.5m. and the difference represents £E6.2m. invested in mining which we excluded. Classification based on the list of completed projects in Ministry of Industry, Industrialization Programmes, Cairo, 1961, pp.12-15.

1960-65: Realized investments of the First Five-Year Plan excluding mining (£E57.4m.) electricity (£E112.6m.) and replacement costs (£E16.3m.); Ministry of Planning, Appraisal of the First 5-Year Plan, i.e., the 2nd Industrial Programme (1960-61-1964/65), Cairo, 1966.

Changes in the structure of industrial employment, shown in Table 5.22 confirm the broad developments depicted by changes in value added and investment. The pattern of industrial development during the period 1945-1967 is fairly typical of most developing countries. First of all, it seems to conform with Kuznets and Chennery's generalizations on the "contemporary pattern of growth";[134] as income per capita increased from £E40 (about $100) in 1945 to £E65 (about $160) in 1966/7, the share of industry in GDP has risen from 15% (11% for manufacturing) to 26.6% (20.5% for manufacturing), while that of agriculture fell from 41% to 26.4%, with the share of transport and services rising from 5% to 5.6% and 39% to 41.4% respectively. Secondly, the concomitant changes in the composition of industrial output follow a growth path similar to that observed by Hoffman, Chennery and Chennery and Taylor about the sequential prominence at increasing levels of income, of different classes of industry.[135] In Egypt, the share of consumer goods in value added declined from about 70% in 1952 to 63% in 1966/67 while that of intermediate and capital goods increased from 25.0 to 29.6% and 3.8 to 6.2% respectively. However, these ratios differ from those implied by Chennery at a per capita income similar to that obtaining in Egypt in 1966/67 ($160). Chennery would have predicted a much lower share of consumer (about 57%) and intermediate (21%) goods, and a much higher rate (22%) for capital goods. These deviations

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134. S. Kuznets "Quantitative Aspects of the Economic Growth of Nations: II. Industrial Distribution of National Product and Labour Force", Economic Development and Cultural Change. (Supplement), July 1957, and H.B. Chennery, "Patterns of Industrial Growth", American Economic Review, September 1960.

135. W. Hoffman, The Growth of Industrial Economies, Manchester, 1958; Chennery, op.cit.,; and C.B. Chennery and L. Taylor, "Development Patterns: Among Countries and Overtime", Review of Economics and Statistics, Vol. L, No. 4, November, 1968.

Table 5.22

Employment in Manufacturing by Major Group
(Establishments Engaging 10 Persons and More)

Industries	1952		1957		1960		1964/5		1966/7	
	000's	%	000's	%	000's	%	000's	%	000's	%
I. Consumer Goods										
20. Food	49,596	18.72	49,592	18.49	49,266	15.15	70,597	13.96	78,779	13.48
21. Beverages	5,531	2.09	3,370	1.26	3,790	1.17	6,439	1.27	5,677	0.97
22. Tobacco	10,594	4.00	7,923	2.95	9,114	2.80	12,556	2.48	12,300	2.11
23. Textile	116,133	43,84	122,141	45.53	164,945	50.74	208,597	41.25	247,627	42.38
24. Wearing Apparel	5,915	2.23	4,139	1.54	4,402	1.35	10,930	2.16	9,935	1.70
26. Furniture	5,846	2.21	7,842	2.92	7,086	2.18	8,065	1.59	8,882	1.52
28. Printing	7,453	2.81	8,913	3.32	8,997	2.77	11,411	2.26	13,550	2.32
29. Leather	2,094	0.79	2,062	0.77	2,025	0.62	2,921	0.28	2,926	0.50
30. Rubber	821	0.31	1,085	0.40	2,163	0.67	4,327	0.86	4,115	0.70
II. Intermediate Goods										
25. Wood	1,022	0.39	898	0.33	1,339	0.41	4,208	0.83	8,579	0.61
27. Paper	5,304	2.00	4,704	1.75	6,755	2.08	10,850	2.15	13,489	2.31
31. Chemicals	11,182	4.22	11,231	4.19	17,021	5.24	43,484	8.60	46,164	7.90
32. Coal and Petroleum	4,576	1.73	6,113	2.28	3,584	1.10	8,747	1.73	10,194	1.74
33. Non-Metallic Products	14,272	5.39	14,749	5.50	12,732	3.92	30,086	5.95	32,623	5.58
34. Basic Metals	3,837	1.45	4,464	1.66	9,503	2.92	22,725	4.49	23,010	3.94
35. Metallic Products	7,585	2.86	8,816	3.29	7,916	2.43	15,060	2.98	25,493	4.36
III. Capital Goods										
36. Machinery (Non-Electric)	554	0.21	1,047	0.39	2,638	0.81	3,690	0.73	8,967	1.53
37. Electrical Machinery	1,102	0.42	1,788	0.67	1,883	0.58	8,467	1.67	11,205	1.92
38. Transport Equipment	8,836	3,34	3,964	1.48	6,647	2.04	15,554	3.08	19,122	3.27
IV. Miscellaneous	2,674	1.01	3,392	1.26	3,340	1.03	6,943	1.37	6,699	1.15
TOTAL	264,927	100.00	268,233	100.00	325,146	100.00	505,657	100.00	584,336	100.00

Source: Department of Statistics and Census, Census of Industrial Production, 1952, 1957, 1960, 1964/5 and 1966/7.

could be attributed to various factors; first, the government intervention in investment planning which favoured consumer and consumer durables to capital goods. Secondly, the important place of cotton in the Egyptian economy which helped the rapid expansion of a domestic textile industry. Finally, the process of industrialization through import-substitution has created a rising demand for intermediate goods (which are increasingly being produced locally), and capital goods (which are almost totally imported).

These developments are also reflected in the changes in the composition of imports of manufactured goods during the same period. Since import substitution generally begins with consumer goods, their share in total imports tends to decline, while those of intermediate goods and raw materials, the inputs of expanding domestic industry, and that of capital goods, tend to increase. The Egyptian experience was not different. Table 5.23 shows a considerable decline in the share of consumer goods between 1945 and 1968, while that of capital goods was more than doubled. The changes between 1952 and 1968 are less pronounced in capital goods but the drop in consumer goods from 35% to 14.7% is remarkable. But this latter development is not to be entirely ascribed to the effect of import substitution. Import controls became increasingly important as an instrument of Government policy especially during the 1960's when strains on the balance of payments became more severe.

Another aspect of industrial development during this period is the increase in the share of manufactures in total exports from the very low figure of 5.1% in 1952 to 17.4% in 1965./ Table 5.24 /. This development is significant in that it

indicates a recent departure from the traditional pattern characterized by an almost exclusive specialization in raw cotton. However, agricultural exports are still the main source of the country's foreign exchange earnings.

Table 5.23

Composition of Manufactured Imports
(percentages)

	1945	1952	1957	1960	1965	1968
I. Consumer Goods	43.3	34.9	54.3	22.1	24.8	14.7
II. Intermediate Goods	40.7	36.7	27.7	44.3	41.6	45.6
III. Capital Goods	16.0	28.4	18.0	33.6	33.6	35.3
IV. Others	0.0	0.0	0.0	0.0	0.0	4.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Samir Radwan, Interrelations Between Industrial Development and Imports...., op.cit., Table 2, p.22.

Table 5.24

Commodity Composition of Exports
(Percentages)

	1952	1960	1965
I. Agricultural Products	3.3	12.6	14.6
II. Raw Materials	85.4	66.5	57.2
III. Fuels	1.0	3.1	8.0
IV. Finished & Semifinished	5.1	14.5	17.4
V. Others	5.2	3.3	2.8
Total	100.0	100.0	100.0

Source: National Bank of Egypt, Economic Bulletin, various issues.

5.3 Conclusion

Basing a discussion of the period 1899 to 1967 on my capital series it appears that (contrary to certain traditional views) industrial development began in Egypt in the late 1890's and continued up to the present despite certain short-term interruptions. Rates of capital accumulation varied systematically and the period can be divided into identifiable swings. Furthermore, the pattern of industrialization changed markedly at certain stages. Periods when C.F. proceeded at high rates were not always accompanied by significant structural transformation. Qualitative changes with important implications for future development sometimes took place in years of crises when the rate of C.F. was low. An interesting feature of the Egyptian experience is the variety of economic conditions and institutional set-ups under which different spurts of industrialization occurred.

Thus we can distinguish three phases of industrial development during this period in terms of the pattern rather than the rate of C.F. The first phase extends between the early 1890's and the late 1920's. Industrialization during this period proceeded under free trade with little or no government support. The pattern was typical of an export economy which generated a need for a small industry related to the processing of exports, and to the demands for a wide range of consumer and intermediate goods. Under free trade imports will tend to satisfy a large portion ofthis demand. The opportunities for domestic manufacturing during this initial phase of industrialization are limited to those which enjoy natural protection. Constraints on the supply of factors of production mainly capital, entrepreneurship and skilled labour affect the pace at which these opportunities

are seized. In Egypt, foreign capital and, in some cases, foreign skilled labour, played a significant role in the early spurt of 1899-1907. Despite the 1907 crisis, the disruption of the First World War, a relative decline in foreign investment and the beginning of local participation, which all affected the rate of C.F., this pattern of industrial development continued until the late 1920's.

The second phase covers the period from 1930's to the early 1950's. "Until then, the development of the industrial sector had been a reflection of export expansion; from then on, industrialization was induced largely through the structural tension provoked by the decline or inadequate growth of the export sector".[136] Furtado defines this phase in these terms for Latin America and his remark, with some qualifications, applies to Egypt. The 1929 Depression increased an early awareness of the need for structural transformation. This coincided with the emergence of national enterprise and the timid beginnings of tariff protection. At the same time the rate of growth of agricultural output was significantly lower than in the late 19th and early 20th centuries, while population pressures began to be seriously felt. World War II, coming soon after the Depression was in a sense the catalyst which precipitated a new pattern of industrialization characterized by import substitution mainly for consumer non durables. This development began in the late 1930's with an expansion of textiles and soap and the appearance of new manufactures such as matches, paper, metallic furniture, and some chemical products. The war reinforced this trend, (despite limitations on Egypt's ability to import machinery) especially in pharmaceuticals, chemicals, kitchen utensels,

136. Celso Furtado, Economic Development of Latin America..., op.cit., p.82.

stoves ... etc. Building materials, which made their first appearance in the initial stage of industrialization, were also greatly expanded partly in response to the rapid urbanization intensified during the 1930's and 1940's by population pressure and migration to the towns.

Rates of capital accumulation and diversification were highest after World War II because developments in the 1930's were retarded by the impact of the Depression on incomes and the relatively weak protection. This phase of import substitution for consumer nondurables and a narrow range of intermediate goods reaches a point where the sector's capacity for continued expansion is limited. Further industrialization involved broadening of the scope of import substitution towards consumer durables, capital goods and heavier intermediate goods which often required a stronger measure of government support.

In Egypt a third phase involving increased government participation and intervention began sometime in the mid 1950's andhas continued to the present. This is a period of deliberate industrialization carried as a part of planned development with the help of import controls. Radical changes in the allocation of investment led to changes in the structure of industrial output which increased the share of consumer durables, basic metals, paper, chemicals, and petroleum. But the diversification in the pattern of industrial investment is too recent to seriously challenge the predominance of consumer goods in total output.

Furthermore, expectations that imports substitutions would remove the strains on the balance of payments did not materialize. This is a familiar situation in developing countries with stagnant agricultural exports. The increase in import

requirements of capital and intermediate goods for industrialization preceeds the growth of manufactured exports. This lag is partly responsible for foreign exchange shortage which in turn has a retarding effect on the programme of industrialization. Between 1959/60 and 1964/65 Egyptian exports increased at the rate of 2% per annum while imports increased by about 10%. Instead of a planned balance of payments surplus equivalent to 2% of GDP, an annual deficit of about 5% obtained during the same period.[137]

The employment effects of industrialization are difficult to assess. On the one hand industrial companies in the public sector were overstaffed after 1962 as a result of the government guarantee to employ graduates; on the other hand the growth of industry has indirect employment effects on other sectors. The share of manufacturing in the labour force increased from 8.4% in 1947 to 9.6% in 1960/61 and 11.1% in 1967/68.[138] This low share signifies a limited absorbative capacity of the industrial sector in a country with rapidly growing population.

The contrast between this third phase and the previous two lies in the role played by the State which evolved from a position of strong support for, and joint participation with private enterprise, to almost exclusive control of modern industry and its management within the framework of the public sector.

The three phases of Egyptian industrial development distinguished here are related to the historical succession of different patterns of industrialization. They supplement our

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137. F. Mursi, Basic Observations on the Balance of Payments Deficit, op.cit., pp.510-513.

138. Figures for 1947 from Department of Statistics and Census, Census of Population, 1960, Vol.II, Cairo 1963, p.XIV. For other years, C.A.G.M.S., U.A.R. Economic Indicators, Cairo, July 1969, p.11.

earlier discussion of the five swings identified in C.F. in terms of changes in the rates of capital growth. The timing of those phases does not imply the strict economic causation of the Rostowian 'Stages'. In fact one of the interesting aspects of the Egyptian experience is the influence of a series of external and domestic events on the timing of the transition from one phase to another.[139] There is however a similarity between Egypt and other developing countries: the three phases of industrialization distinguished here are identical as regards the pattern, not necessarily the timing and duration, to Furtado's analysis of industrial development in Latin America.

Finally, two findings of this chapter should be stressed. One relates to a feature of Egyptian economic development; the vulnerability of investment in an open agrarian economy to natural accidents in agriculture, short term adverse trade conditions, World depressions and wars. Thus the fall in the rate of C.F. in 1907-10, 1914-19, 1931-35, 1940-45, 1957, 1961 and 1967. Despite industrial development and diversification and structural transformation of the economy after World War II, this vulnerability has not been significantly reduced.

The second feature concerns the historical interpretation of Egypt's industrial experience. Developments at the turn of the century appeared in a new perspective. The 1920's and 1930's, often considered in the traditional histriography as the beginning of industrialization, seem more important for the qualitative changes in institutions and attitudes than as a period of rapid capital accumulation. We also discerned an underlying continuity in the twenty-two years following World War II.

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139. For an interesting analogy with Japan compare K. Ohkawa and H. Rosovsky, A Century of Japanese Economic Growth, in W. Lockwood, The State and Economic Enterprise in Japan, Princeton University Press, 1965, pp.47-51.

CHAPTER SIX

CONCLUDING REMARKS

Having estimated C.F. in the two commodity secotrs, outlined the broad historical, economic and institutional factors that affected the rate and structure of C.F., and made an attempt to discern the long-term pattern of growth in the C.S. for agriculture and industry, I will now discuss, in conclusion, the two sectors together in order to compare the rate and pattern of C.F. and try to bring together the various themes that emerged from the previous analysis.

A comparison of the rates of C.F. in the two sectors during the period of study reveals a distinct divergence, namely, that the swings about the general trend are much more pronounced for industry than for agriculture. The rate of agricultural accumulation which maintained an almost constant level of about 3.5% on average during the three upswings, contrasts with the behaviour of C.F. in industry where average rates ranged between 3.9 and 6.2%. Moreover, the drop, during the two downswings, in the rates of C.F., was much sharper in industry than in Agriculture [Table 6-1].

TABLE 6-1

AVERAGE ANNUAL RATES OF GROWTH OF NFCS, %

Periods	I	II	III	IV	V
Agriculture	3.01	1.08	3.63	0.88	3.80
Industry	6.21	-0.74	3.92	-3.47	5.29

Source: Tables 4-2 and 5-2 above.

This variation in the rate of C.F. can be attributed to the difference in the investment behaviour in the two sectors. In Egypt, agricultural production has always been dependent on the utilization of the Nile water through the building and continuous improvement of a central system of irrigation. A distinctive feature that characterized the development of this system was the sequence in which the exhaustion of opportunities created by investment in one phase called for a further round of investment in a new phase. Thus the first stage involved the extension of the irrigation network to cultivable areas in the Delta and the Valley, following the introduction of cotton and summer crops in the early 19th century. Once the arable land frontier was reached, sometime in the 1880's, it became essential to invest in an annual storage project (the Aswan Reservoir, 1902) to facilitate a more intensive use of land through multiple-cropping. Furthermore, this expansion created the need for investment in complementary areas: the increase in subsoil water-logging, resulting from perennial irrigation, necessitated investment in drainage, and the deterioration in soil fertility due to multiple-cropping, led to the continual use of chemical fertilizers. At a later stage, when further increases along the intensive margin became subject to rapid diminishing returns, a new phase of development involving massive investment in a century-storage project (the High Dam, 1960-70), became an essential precondition for the extension of cultivation to marginal land.

It is not suggested here, however, that this sequence of investment phases and their timing were inevitable as they were determined by financial and political factors affecting investment decisions at different periods. But it remains

true that in a country like Egypt, where agriculture is the dominant economic activity, and where the growth of agricultural output is crucially dependent on water supply, the government, traditionally responsible for investment in irrigation and public works, cannot afford to ignore for long the pressure to allocate funds for such vital investments.

This apparent continuity of investment in irrigation was also shared by other components of agricultural C.F. except livestock, the erratic behaviour of which may be attributed to chronical fluctuations in the fellah's income and changes in the price of meat. But investment in dwellings and agricultural machinery was much smoother, as the first was closely related to the growth of rural population, and the latter mainly represented the set of essential traditional tools owned by the successive generations of family farmers.

Unlike agriculture, investment in industry was up to the mid-1950's undertaken almost entirely by the private sector where the investment decisions were much more open to market forces (availability of funds, cost, relative profitability, etc.). Hence the possibility of sharper fluctuations in the rate of C.F. Moreover, industry as a newly established sector was more likely to be much less attractive to funds than a profitable export-oriented agriculture, and more vulnerable to the effect of shortage in finance and shattered confidence under conditions of war and crises.

A further aspect of comparison between the two sectors is the contrasted types of structural transformation that accompanied the growth of C.F. In agriculture, transformation was a reflection of the alternation between basic investment in irrigation and drainage and inputs embodying technical progress, such as fertilizers and improved seeds, as leading inputs.

A parallel development was the decline from 1900 onwards in the share of old inputs such as dwellings and livestock, and the slow rise in the small share of new inputs represented by machinery particularly after World War II.

Structural change in industry was of a different type. Gauged from available data on output and employment, this change appears to have been the result of industrialization policies adopted at different phases of development. During the initial phase (1890's-1920's) when industrialization proceeded under a policy of free trade, the pattern was typical of an export economy which generated a need for a small industry related to the processing of exports, together with a limited number of naturally protected goods such as food, beverages and building materials. The second phase (1930's-1950's) which coincided with the increasing awareness of the need for industrialization the emergence of national enterprise, and the timid beginnings of tariff protection, was characterized by a new wave of industrialization based on import-substitution for consumer non-durables and a narrow range of intermediate goods. A third phase involving increased government participation and intervention began sometime in the mid-1950's and has continued to the late 1960's. This was a period of deliberate industrialization carried as a part of planned development. Radical changes in the allocation of investment led to changes in the structure of industrial output which increased the share of consumer durables, and intermediate goods (such as basic metals, paper, chemicals and petroleum), but the shift to capital goods was much retarded and of small significance.

Finally, despite variations in the rate and structure of

of C.F. we can observe certain similarities in the two series. They both suggest that growth took the form of a succession of surges in the rate of C.F., or upswings, followed by periods of retarded growth or downswings. In other words, growth was discontinuous and took place in spurts. Moreover, the timing of the swings was almost identical in the two sectors. While the forces operating on C.F. in agriculture were in instances different from those that affected investment in industry, they were for the most part interconnected.

The two downswings for instance, were precipitated by conditions created by the two World wars which interrupted flows of cotton exports and imports of machinery, irrigation equipment, construction materials and fertilizers. Similarly, the effects of international depressions - shattered business confidence, and scarcity of investible funds - initiated the 1907-20 downswing and reduced the force of the 1920-39 upswing in both sectors. But it is interesting to note that wars and crises had different impacts on output. Agricultural output dropped sharply during the two wars, while industrial production increased as domestic manufactures flourished under wartime protection from foreign competition.

Common factors were also instrumental in initiating the three investment spurts. The influx of foreign capital at the turn of the century, attracted by the expanding cotton economy, also explains the rather surprising spurt of 1899-1907 in industrial C.F. On the other hand, the outflow of domestic capital after the First World War, led to shortages of investible funds in the economy and partly accounts for the relative weakness of the interwar spurt in industry which depended on private investment.

Institutional factors were not much less important for

capital accumulation. Bank Misr provided finance for many industry, the Crédit Agricole offered the peasants cash to buy livestock and working capital, thus relieving them partly from the eternal burden of indebtedness and consequent loss of land to the usurer, while the growth of banking following the relaxation of religious ban on interest helped in marshalling large funds otherwise kept idle. The role of the State was much more complex. In Egypt, investment in irrigation and public works, the largest component of C.F. in agriculture, has always been the responsibility of central government. Industrial investment remained almost entirely in the hands of the private sector up to the late 1950's, but has always been sensitive to Government policy. For instance, the late start of the textile industry, now a major activity in Egyptian manufacture, was due to the absence of tariff protection until 1930. The Government's support for industry in the post war period, which evolved from tariff protection and fiscal incentives to direct investment and comprehensive planning, was among the important factors behind the 1945-67 investment spurt.

Having compared the growth rates, contrasted the types of structural change and described the alternation of long swings in C.F. in agriculture and industry over the period 1882-1967, I will now indulge in some speculation on the general pattern of growth of the Egyptian economy during this period. The question to be asked is whether the changes in the rate and structure of C.F. in agriculture and industry were indicative of, and consistent with specific patterns of growth for the economy as a whole? Were the three upswings in C.F. associated with similar or different patterns of development? More specifically, can we identify, during this period of

Egypt's modern history, a "big spurt" of the Gerschenkron type, marking the transition from a relatively backward, export-oriented, into an industrialized economy?

Gerschenkron[1] has suggested that industrialization when launched in a backward country shows considerable differences both in the speed of development and in the organizational structure of industry, when contrasted with more advanced countries. These differences result, to a great extent, from the "application of institutional instruments for which there was little or no counterpart in an established industrial country."[2] Certain characteristics of development during a country's initial period of industrialization, or "great spurt" can be better understood if reference is made to that country's relative backwardness just prior to the spurt. Referring to the experience of some European countries (Germany, France and Russia) which began their rapid industrialization in the 19th century, Gerschenkron stated that the greater a country's relative backwardness on the eve of its spurt, the more acute the "tension" between the actual state of economic activities and the great promise inherent in development which often does not occur unless major institutional obstacles to development have been removed, the more likely that industrialization would start as a sudden great spurt, and the more rapid the subsequent rate of manufacturing growth, the greater the stress on bigness of both plant and enterprise, the more pronounced

1, The original statement of his thesis appeared first in A. Gerschenkron, Economic Backwardness in Historical Perspective, A Book of Essays, New York, 1962, pp.5-30, and later developed in his article on "The Early Phases of Industrialization in Russia and their Relationship to the Historical Study of Economic Growth" in H.E. Supple, (ed.), The Experience of Economic Growth, New York, 1963, pp.428-44.

2. Gerschenkron, Economic Backwardness, op.cit., p.7

the stress on producers' as opposed to consumers' goods, the heavier the pressure on the level of consumption, the greater the role played by special institutional factors designed to speed industrialization. Finally, Geschenkron expected that the contribution of the agricultural sector to economic growth, by offering nascent industry the advantages of a growing internal market as a result of increased agricultural labour productivity would be relatively small.[3]

Before examining the applicability of these propositions in the Egyptian context, one needs to establish whether and when did the country experience a "great spurt". Gerschenkron specified two characteristics of a "great spurt" - a sudden and rapid increase in the rate of manufacturing growth, and a continuation of that growth through a period of international depression.[4] It is difficult, in the absence of sufficient data on output, to test quantitatively these two conditions. On the other hand, if the rate of C.F. is to be used as an indirect measure of industrial growth, a decision has to be taken on which of the three upswings in C.F. should be regarded as indicative of the "big spurt". To start with, an important aspect where the Egyptian experience diverges from the Gerschenkron path is the absence of a unique spurt in the sense of a sharp discontinuity in the rate of growth implying a sudden and revolutionary industrial eruption. In Egypt, the

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3. So far there has been only one attempt to test rigoriously Gerschenkron's thesis; L.S. Barsby, "Economic Backwardness and the Characteristics of Development", in Journal of Economic History, Vol.29, No.3, September 1969, pp.449-72. Another attempt to test the heuristic power of Geschenkron's model was made by H. Rosovsky in his study of Capital Formation in Japan, 1868-1940, Free Press of Glencoe, 1961, pp.55-104.

4. Gerschenkron, The Early Phases of Industrialization in Russia, op.cit., p.163.

process of transition from a predominantly agricultural into industrialized economy has been slow and protracted and it would be difficult to talk of a unique event in history when such transition suddenly takes place. Nevertheless, the upswing of the 1920's and 1930's can be considered as the beginning of a prolonged spurt. All the preconditions of a Gerschenkron spurt (industrialization as a national ideology, favourable institutional changes) were present, but their impact was undermined by the effect of adverse factors (coincidence of the Great Depression, hesitant government support, scarcity of investible funds as the inflow of foreign capital was drastically reduced and Egypt was repaying her debts abroad). The significance of this spurt, therefore, is not so much in the attainment of a high rate of industrial growth[5] but that it initiated a new wave of industrialization which continued uninterrupted through the rest of our period. Unlike the short-lived spurt of 1899-1907, related to the influx of foreign capital and failing to survive the 1907 financial crisis, the inter-war spurt continued through a period of successive international depressions. In fact if we ignore the inevitable drop in the rate of C.F. during World War II, and take into consideration the remarkable growth that took place in industrial output, the period 1920-1967 can be regarded as one continuous industrial spurt.[6] Seen in historical perspective, this period can be looked upon as the time when attempts were made to transform the export-oriented economy of Egypt into a more diversified one where industry replaces agriculture as a "leading sector".

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5. In fact the rate of C.F. was much lower (3%) than that of the 1899-1907 upswing (13.5%).

6. See Table 5-18 above.

At this point, an analysis of the pattern of development during the preceding century which witnessed the establishment of the export economy, is necessary to understand the circumstances leading to this transformation. The Ranis and Fei model of "open-agrarianism" provides a relevant framework for the interpretation of Egypt's experience during this period.[7]

According to Fei and Ranis, the transition of most under-developed countries from "closed" to "open agrarianism" is usually promoted by the creation of a new export sector and the integration of the economy, as an agricultural unit, into the international economic system. An important instrument of this transition is the penetration of the closed agrarian system by a new economic agent, the foreigners and a new domestic commercial class. Starting as traders, their role expands steadily to that of enterpreneurs servicing the export sector or actually taking over the direction of its activities and, at a later stage, they might also turn to the construction of trade-related social overhead capital. A characteristic institutional change in "open agrarianism" is the introduction and gradual acceptance of a new mode of rational economic behaviour where profit maximization displaces feudal and kinship relations. An understanding of the way in which export proceeds are spent, throws considerable light on the internal logic of "open agrarianism". Incomes from exports can either be spent on consumption (luxury goods for the export related entrepreneurs, and incentive consumer goods for rural consumption which are almost entirely imported), reinvested or

7. C.H. Fei and Gustav Ranis, "Agriculture in the Open Economy", in E. Thorbecke (ed.), The Role of Agriculture in Economic Development, N.B.E.R., New York, 1969, pp.129-64.

repatriated. The fact that repatriation is possible insures that not all the savings generated by the export sector will necessarily be used for capital accumulation within the system. Moreover, whatever capital is invested within the system, is largely attracted either to the export sector itself or trade-oriented commercial and social overhead capital (shipping, banking, insurance, transport, housing and electric power). It is this pattern of accumulation that largely accounts for the prognosis, made by Fei and Ranis, for open agrarianism as one of "ultimate stagnation". The growth that does take place by opening up the closed agrarian economy may be substantial, but "as long as it is restricted to the export production sector as an enclave in an otherwise stagnant, but still preponderant, agricultural hinterland, the prospects are for ultimate stagnation".[8] A considerable number of less-developed countries remain trapped in the open agrarian situation due to the failure of development in the export enclave to alter the mode of agricultural production in any meaningful way. In this context, industrial capital formation in the sense of "a dualistic or mature economy has not as yet put in an appearance" and "required routinized interaction between a small but relatively expanding industrial sector and a large but relatively shrinking agricultural sector has no chance to take hold".[9]

In Egypt, the pattern of growth during the period 1820's-1920's can generally be regarded as typical of open agrarianism. For a century since its introduction in 1820, cotton had become the centre of all economic activities. As Issawi pointed out, "cotton was the main beneficiary of the government's investment

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8. Ibid., pp.155-6.
9. Ibid., p.157.

on public works and the magnet drawing private foreign capital to Egypt. All the other sectors of the economy such as transport, commerce and finance, had as their main function the moving of the cotton crop. Most of the capital investment that did not directly serve cotton was used for providing amenities, such as tramways, gas, electricity, and water, suitable to the level of income generated by the increase in cotton. And the greater part of imports paid for by cotton exports consisted of consumer goods demanded by the beneficiaries of this rise in incomes".[10]

In this context, the spectacular growth of the cotton sector in particular and agriculture in general, though accompanied by some manifestations of economic progress such as the expansion of foreign trade, creation of a sophisticated infrastructure and rise in incomes, did not lead to the transition from an export-oriented economy to a more complex and diversified one. Unlike Japan, where a rapid increase in agricultural productivity provided the basis for the creation of a modern industrial sector, Egypt lacked the mechanism for transmitting the expansion generated by cotton to other areas of economic activities.[11] According to Issawi this was "partly

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10. Charles Issawi, "Egypt Since 1800: A Study in Lop-sided Development", in the Journal of Economic History, Vol.XXI, No.1, March 1961, p.11.

11. For a comparison of the Egyptian and Japanese experiences up to 1914 see E.R.J. Owen, Cotton and the Egyptian Economy, 1890-1914, Oxford, 1969, pp.356-64. Owen argues that various other reasons account for this difference in performance; the attitude of the Japanese Government after the Meiji reform (1868) which made economic development a primary national objective, Japan's longer industrial tradition, larger numbers of educated people, improved agricultural techniques and more favourable social attitudes.

due to the fact that incomes earned by foreign capital were not reinvested in the country, partly because a larger part of the rise in rents and other incomes of the richer classes in Egypt was spent abroad and partly because of the growth in mass consumption due to rapidly increasing numbers and, until the 1920's, a rise in the level of living".[12]

However, an important departure of the Egyptian experience from "open agrarianism", and which the Fei and Ranis model fails to accommodate, is represented by the beginning of an initial phase of industrialization which, under conditions of free trade, was limited to those industries processing cotton for export, and those protected by natural advantage. But it remains true that up to the 1920's further development in this direction was inhibited by forces inside the export sector itself. Relatively higher profits obtained from operations in cotton and land must have been among the important factors discouraging investment in industry. Merchants and landlords used their power to ensure that it was the development of the country's agricultural resources which took precedence over anything else. Again, importers tended to resist attempts by local manufacturers to obtain a market for their products, while consumers became so used to imported products that they soon developed a strong prejudice against anything which did not carry a foreign label.[13]

The 1920's and 1930's were to witness the beginning of a gradual, but profound change in this pattern of development. "Tension" was building up between the state of the economy and aspirations for the "promises of development". Successive

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12. Issawi, op.cit., p.22

13. Owen, op.cit., pp.369-70.

agricultural crises (1920, 1921 and 1926) which culminated in the Great Depression (1929-32), indicated that the export-led growth of the past century was showing signs of exhaustion, and increased awareness of the need for diversification. Following the 1919 Revolution, the national movement for independence was gaining ground. To many Egyptians industrialization was an essential ingredient of the complex of aims and symbols associated with the idea of independence. The country's emerging educated élite, nourished with European ideas, thought of industrial development as the basis of modernization and progress. Population growth and rapid urbanization had begun to create pressures for employment and expectations for a standard of living that agriculture alone would not provide. These factors combined together to create what Gerschenkron describes as a "new climate" where industrialization becomes a "national ideology". Moreover, important institutional obstacles were removed. Egypt has regained her fiscal autonomy by 1930 and was now capable of providing tariff protection for her infant industry, Bank Misr challenged the established banking traditions by engaging directly in promoting a number of new industrial concerns, and there was a relaxation of the Islamic ban on interest. The stage was, therefore, set for a new industrial spurt.

The nature of Egyptian response was in certain respects similar to that predicted by Gerschenkron when industrialization takes place in a setting of relative backwardness; the relatively large role of special institutions and the retarding effect of backward agriculture. It diverged, however, by manifesting a greater stress on light industries, less emphasis on bigness and avoiding a pronounced pressure on the level of consumption.

Now, I shall examine each of these aspects in turn in order to establish the uniformities and peculiarities of the Egyptian experience during the last five decades in comparison with that of 19th century Europe as exemplified by Gerschenkron's thesis.

Gerschenkron argues that in a backward economy, the low level of domestic incomes implies a relatively restricted demand for consumer goods and makes the sources of capital relied on in advanced countries, commercial banks, auto-financing and the stock market - inadequate, so that other forms of intermediation such as investment banks or, if backwardness is very pronounced, the State, have to play a relatively bigger role. In Egypt, we saw how Bank Misr was instrumental in the inter-war industrial spurt as it played a role similar to that of the Crédit Mobilier in France of Napoleon III and German banks until the First World War. Bank Misr, the platform of the emerging enterpreneurial class, was first to draw on small savings, to encourage the beginning of investment by landlords in industry, and, above all, to engage directly in the establishment of new industrial concerns, thus marking a distinctive departure from the prevailing banking traditions hitherto devoted to the service of the cotton sector.

"In no other country" said Napoleon, "does the prosperity and welfare of the inhabitants depend so directly upon the government as in Egypt".[14] It emerges clearly from Chapter Five that government support, as well as its absence, have affected to a certain extent the course of development. Lack of support, and sometimes hostility, to industry partially explain the limited industrial growth that characterized the

14. Quoted by A.E. Crouchley, The Economic Development of Modern Egypt, London, 1938, p.53.

period from 1840's to 1920's. The gradual support initiated by the 1930 tariff protection, and manifested in government investing in social overhead capital especially power and transport, favouring domestic products in its purchases and providing credit facilities through the new Industrial Bank, was among the factors underlying the beginning of our spurt. Finally, the acceleration of industrial growth between the mid 1950's and 1967reflects to a large extent the effect of the government's deliberate policy of industrialization. During this period, the State's control on the size and direction of investment has been rapidly increasing culminating in total nationalization in 1961 and the management of industry within the framework of a public sector, according to the national plan. An important distinction should be made, however, between the role of the state in Egypt as compared with Germany, Russia and Japan. In Egypt, except under Mohamed Ali, industrialization was not motivated by the military needs of the State, but rather as a reflection of the government policy identifying industrial growth with development.

Another aspect of Gerschenkron's model which is relevant to Egypt relates to the limited role of agriculture in the process of industrialization. In Egypt, agriculture failed to create a growing market for industrial products except for fertilizers and textiles. It provided, however, backward linkages supplying most material inputs to industry in general and to food and textiles in particular. Industry in turn, failed to contribute significantly to the development of agriculture by supplying it with new inputs such as pumps, machinery and new seeds necessary to the growth of productivity.[15]

15. Up to now Egypt is far from self-sufficient in chemical fertilizers. Out of total supply of 1,979,000 tons in 1966, domestic industry provided 1,329,000 tons (about 66%).

It must be stressed however that after half a century of industrialization Egypt's dependence on agriculture is by no means insignificant. By 1967 this sector accounted for 75% of the country's exports, 29% of G.D.P. and 50% of total employment. Thus the difficulties of industrialization in an economy predominatedyby stagnant agriculture. The role of agriculture in Egypt was different from that of Japan where the remarkable increase in productivity (1868-14) was largely used to finance industrial accumulation, and the Soviet Union where drastic changes in institutions were used to mobilize and transform agricultural surplus into industry.

One of the important aspects where the Egyptian experience diverges from the Gerschenkron path is the lack of stress, until very recently, on producers' goods. The small structural changes favouring intermediate goods (in the post-war years), and capital goods (only in the 1960's as a result of deliberate government policy), had not greatly reduced the dominance of consumer goods. By the end of 1966/67, the share of capital goods represented only 11% of investment, 4% of employment and 6% of value added in modern industry. Egypt is by no means unique in this respect as her pattern of industrialization is to a great extent consistent with the 'contemporary pattern of growth' observed by Chenery and Kuznets. Moreover, Rosovsky found out that the stress in the early phases of Japanese industrialization was more on light rather than heavy industries. This divergence from the Gerschenkron pattern can be generally explained by the strategy of import-substitution followed by Egypt and perhaps the raw material base, the shortage of skilled labour and entrepreneurial abilities.

Neither was there an emphasis on bigness in the physical sense, and on the latest and most capital-intensive techniques.

According to Gerschenkron, such emphasis seems to result largely from the inability to form an industrial labour force quickly. Egypt as a late-comer, based her industrialization on borrowed technology by depending almost totally on imported capital goods and forms of organization. But, although the techniques adopted in the modern sector were in sharp contrast with those used in traditional manufactures, and the joint-stock type of organization dwarfed family-managed units, the scale and capital intensity of Egyptian industry remained much smaller than in advanced countries. The reason may be found in relative factor endowment. In Egypt, as in pre-war Japan, it was relatively easy to recruit a rapidly growing, disciplined working force, but much more difficult to mobilize capital. Unlike Japan, however, Egypt failed to adapt borrowed technology to the needs of an economy where labour is relatively abundant and capital desperately scarce.

A high rate of C.F. during the industrialization spurt may lead to pressure on consumption as in Russia, the country which Gerschenkron had in mind. There is no clear indication of rising rates of domestic savings in Egypt during the period considered. Although the share of private consumption in national income has tended to fall significantly in recent years, it seems that the government did not attempt at first to curb private consumption for the purpose of investment relying on accumulated reserves and then on balance of payments deficit to finance a higher investment ratio. In the 1960's public consumption began to rise at a high rate because of the employment policy and the increase in expenditure on social services and military effort. The growth of private consumption was curtailed without apparent effects on the savings ratio, which continue to fluctuate around 12%, and ultimately the

investment ratio which amounted to 18% in 1964, fell to 11-12% consistent with the balance of payments equilibrium. Because of balance of payments difficulties, quantitative restrictions have often been applied to imports of consumer goods. But this 'interference with consumer's sovereignty' should be distinguished however from reductions in disposable income. Gerschenkron's proposition relating to pressures on consumption does not apply without serious qualifications to Egypt. At one time, foreign aid and indebtedness provided a release, at another public consumption, rather than investment absorbed the proceeds of higher taxation.

But the most significant difference between the Egyptian experience and Gerschenkron's model, as mentioned earlier, is the absence of a "big spurt" in the sense of a sudden and revolutionary industrial eruption. One of the contributions of this study is to reveal the intermittent character of development as reflected by the behaviour of C.F. In economic development there is rarely a unique historical event such as the Rostowian "take-off" which places the economy on the path of "self-sustained growth". The transition from a backward to an industrialized economy tends rather to be a long and protracted process. To surmount the complex problems inherited from centuries of underdevelopment is bound to be a difficult task extending over a long period of time.

TABLE A-1

Price Indices Used in the Deflators

Year	Agriculture Money Wage Index: Wholesale Price Index 1913=100 (1)	Agriculture Money Wage Index: Money-Wage Index 1914=100 (2)	Agriculture Money Wage Index: Money-Wage Index 1960=100 (3)	Industrial Money Wage: Piaster Per Week (4)	Industrial Money Wage: Index 1960=100 (5)	U.K. Price Indices of Capital Goods Exports: Machinery 1913=100 (6)	Industrial Machinery 1928=100 (7)	Agricultural Machinery 1935=100 (8)	Machinery & Transport Equip. 1960=100 (9)	Iron & Steel 1960=100 (10)	Cement (11)	Price Index of Egypt's Imports of Capital Goods 1960=100 (12)	Price Index of Building Materials 1960=100 (13)	Price Index of Metals 1960=100 (14)
1882						101.3				12.4	29.1			
83						98.5				11.2	28.7			
84						94.7				10.3	27.9			
85						91.9				9.2	27.3			
86						82.9				9.1	25.1			
87						76.0				9.0	24.1			
88						77.8				8.6	23.6			
89						83.4				9.3	24.2			
1890						97.6				10.4	25.3			
91						92.8				10.1	24.6			
92						85.0				9.5	22.7			
93						80.1				9.1	21.1			
94						77.0				8.9	20.5			
95						74.0				8.5	20.1			
96						74.0				8.5	20.4			
97						75.0				8.9	20.5			
98						75.5				8.8	23.2			
99	61		15			72.3				10.2	24.3			
1900	67		17			84.2				12.4	24.5			
1	62		16			81.4				10.1	23.7			
2	60		15			82.3				10.1	21.4			
3	63		16			87.2				10.1	21.0			
4	63		16			89.3				9.8	20.4			
5	66		17			85.6				9.9	19.6			
6	72		18			85.6				11.1	18.8			
7	75		19			87.2				12.3	20.6			
8	78		19			89.9				11.1	19.9			
9	79		20			92.4				10.5	18.4			
1910	83		21			92.0				10.4	17.9			
11	83		21			93.8				10.6	18.8			
12	90		22			95.7				11.1	19.6			
13	100		25			100.0				11.7	21.1			
14	99	100	25			110.8				11.0	21.1			
15	105	126	32			131.5				13.3	24.3			
16	140	153	38			134.2				20.3	30.2			
17		179	45			160.0				25.2	38.9			
18		205	51			192.9				27.9	45.7			
19		232	58			224.0				28.5	66.1			
1920		258	65			263.9	147.0	183.5		38.8	74.9			
21		245	61				163.7	196.1		36.5	71.2			
22		233	58				144.1	125.7		17.5	40.4			
23		221	55				109.1	124.7		17.3	33.5			
24		209	52				104.5	125.1		19.0	30.7			
25		197	49				102.3	119.1		17.9	31.5			
26		185	46				103.0	123.4		17.1	33.0			
27		173	43				99.8	115.9		16.3	33.3			
28		161	40				100.0	119.9		15.1	31.1			
29		117	29				100.5	117.6		15.0	28.6			
1930		109	27				101.4	121.5		15.1	27.3			
31		101	25				104.4	118.8		14.2	25.5			
32		93	23				102.2	118.6		13.3	23.1			
33		85	22				104.5	118.0		13.6	20.4			
34		58	15				104.3	115.9		13.9	18.1			
35		71	18				103.6	100.0		13.7	18.1			
36		83	21				107.6	98.4		14.1	18.3			
37		96	24	47	22		116.4	95.4		16.3	19.5		19.5	16.3
38		96	24	48	22		131.8	102.1	25.4	16.8	20.4		20.4	16.8
39		96	24	48	22		158.5	102.1	25.9	16.3	19.5		19.5	16.3
1940		106	27	54	25				31.2				36.3	31.2
41		115	29	66	30				34.8				47.8	44.0
42		158	39	95	44				39.8				54.9	61.0
43		200	50	86	40				43.1				61.1	74.5
44		246	62	106.5	49				43.4				69.9	80.1
45		292	73	117.5	54				43.1				107.1	77.3
46		299	75	124	57				[illegible]				83.2	56.2
47		306	77	133	61				5.3				79.6	58.2
48		313	78	146.5	68				40.9				81.4	61.7
49		320	80	145	67				42.9				78.3	61.8
1950		328	82	160	74				45.5				68.1	63.8
51		424	106	172	79				74.0				76.8	74.5
52		391	98	187	86				82.5				95.6	80.9
53		358	90	178	82				83.2				88.5	70.9
54		327	82	194	89				83.8				83.2	63.1
55		294	74	203	94				85.5				85.8	68.1
56		386	97	205	95				88.3				98.2	76.6
57		392	98	216	100				92.9				101.8	87.2
58		398	100	219	101				96.0				99.1	92.2
59		404	101	218	101				98.0				96.5	97.9
1960		400	100	217	100				100.0			100	100.0	100.0
61		392	110	219	101							125	101.8	103.5
62			120	212	98							114	103.5	108.5
63			130	246	113							120	102.7	112.1
64			140	264	122							141	104.4	117.0
65			150	301	139							165	115.0	127.0
66			179	334	154							127	117.7	130.5
67			208	335	154							149	117.7	131.2

Sources: (1) M. el-Darwiah, A New Series of Index-Numbers of Wholesale Prices in Egypt, 1899-1929. Cairo, 1931.

(2) B. Hansen, "Marginal Productivity Wage Theory and Subsistence Wage Theory in Egyptian Agriculture", Journal of Development Studies, Vol. II, No. 4, July 1966, Table III, p.405.

(3) The two indices (1) and (2) spliced together and base-year shifted to 1960.

(4) Average weekly wage obtained from; M. A. Anis, "A Study of the National Income of Egypt", L'Egypte Contemporaine, Nos. 261-2, 1950, p.805 for 1937-41 for 1942-62; R. Mabro, "Industrial Growth, Agricultural Unemployment and the Lewis Model: the Egyptian Case, 1937-65", Journal of Development Studies, Vol. III, No. 4, July 1967, p.335, and I.L.O., Yearbook of Labour Statistics, 1969, Geneva, 1970, p.536 for 1963-67.

(6) This index was obtained by dividing annual figures of the value at current prices of U.K. exports of "Machinery" (B. R. Mitchell and P. Deane, Abstract of British Historical Statistics, Cambridge, 1962, Table 8, pp.304-5) by the corresponding volume index, 1913=100 (Werner Schlote, British Overseas Trade From 1700 to the 1930's, Oxford, 1952, Table 16, pp.153-4).

(7) A weighted average of the price indices of various groups of exports of industrial machinery from the U.K. as calculated by H. J. D. Cole, "Machinery Prices Between the Wars", Bulletin of the Oxford University Institute of Statistics, Vol. 13, No. 3, March 1951, Table I, p.84. Indices weighted by the shares of various groups in Egypt's imports of industrial machinery (average 1927-29).

(8) Cole's index of U.K. exports of agricultural machinery, H. J. D. Cole, op. cit., p.84.

(9) U.K., Central Statistical Office, Annual Abstract of Statistics, various issues. Prior to 1954, comparable figures were published under the heading "Metal Goods" (1938-47), and "Metal Goods and Engineering Products" (1947-54). All these indices were spliced together and base-year shifted to 1960.

(10) For 1882-1920, the index was obtained by dividing annual values of U.K. exports of "Iron and Steel" (Mitchell and Deane, op. cit., Table 8, pp.304-5) by their volume (Schlote, op. cit., Table 16, pp.153-4). For 1920-26, the same procedure was applied to data from the Statistical Abstract of the U.K., various issues. For 1926-37, we used the average price index of U.K. exports of "Iron and Steel and Manufactures" published by the Board of Trade Journal, various issues.

(11) Average prices of U.K. exports of cement reported by the Statistical Abstract of the U.K., various issues.

(12) C.A.P.M.S., The Development of Foreign Trade During the Five Year Plan 1960-65, and the Years 1965/66 and 1966/67. Cairo, 1968, p.75.

(13) and (14) National Bank of Egypt, Economic Bulletin, various issues.

TABLE A-2

MAJOR DAMS AND BARRAGES ON THE NILE

	Date of Foundation	Cost at Current Prices, £E000
The Delta Barrage	1861	4,000
Aswan Barrage	1898-1902	3,043
Assiut Barrage	1902	870
Zefta Barrage	1901-1903	305
Zefta Barrage subsidiary work	1905-1907	32
Esna Barrage	1906-1908	945
Aswan Barrage (First Heightening)	1912	1,500
Sennar Dam	1925	6,300
Nag-Hammadi Barrage	1928-1930	3,705
Aswan Barrage (second heightening)	1933	4,600
Jebel el Aulia Dam	1933-1934	3,500
Assiut (Reconstruction)	1934-1938	1,200
Mohamed Ali Barrage (to replace the Delta Barrage)	1934-1939	2,500
Esna Barrage (Reconstruction	1945-1948	3,000
Edfina Barrage	1951	4,000
The High Dam	1960-1970	618,000

Sources: Ministry of Public Works, Annual Report, Various issues, and National Bank of Egypt, Economic Bulletin, Vol.18, No.4, 1965 (for the Cost of the High Dam).

Table A-3

Number of Rural Dwellings and Rural Population in Census Years

Year	No.(1)	Rural Population(2)	Urban Population	Total
1882	802,597	(5,742,294)	(1,087,306)	6,829,600
1897	1,251,012	(8,039,212)	(1,687,088)	9,726,300
1907	1,579,598	9,259,841	2,027,518	11,287,359
1917	1,781,489	9,807;449	2,843,451	12,750,900
1927	2,107,842	10,407,039	3,770,825	14,177,864
1937	2,456,229	11,484,588	4,436,106	15,920,694
1947	2,562,219	12,704,465	6,262,302	18,966,767
1960	2,700,000	16,120,398	9,863,703	25,984,101
1966	3,500,000	17,691,356	12,384,502	30,075,858

(1) A house is defined in the Census as a building or part of it with its separate entrance and used for living by a family. Figures adjusted to exclude houses occupied by inhabitants not engaged in agricultural activities and include those living in towns but engaged in agricultural activities.

(2) The breakdown between rural and urban is based on administrative distinction; the urban population includes all people counted in the major urban governorates, capitals of all other governorates and 'markaz', district, capitals. Figures for 1882 and 1897 are my estimates.

Sources: Department of Statistics and Census, Population Census of Egypt, 1882-1960 and C.A.P.M.S., Final Results of the Population Census by Sample , 1966, Vol. II, Cairo, 1967.

TABLE A-4

LIVESTOCK PRICES IN 1960

	Price per Animal £E
Cows, big(1)	50
medium	20
Buffalos, big	90
medium	35
Sheep, big	6
Goats, big	4
Camels	50
Horses	70
Mules	30
Donkeys	10
Pigs	5

(1) Big animals = above three years of age, medium = 1-3 years and small = less than one year.

Source: Department of Statistics and Census, National Income from Agriculture, 1958-1960, Cairo, 1962.

TABLE A-5

AREA ALLOCATED TO CLOVER, 'BARSEEM', 1894-1904

Year	Area in Thousand Feddans
1894	1,337
1895	1,449
1896	1,566
1897	1,579
1898	1,582
1899	1,600
1900	1,577
1901	1,633
1902	1,584
1903	1,659
1904	1,680

Source: Department of Statistics and Census, Annuaire Statistique, Various issues.

TABLE A-6

NUMBER OF LIVESTOCK IN EGYPTIAN AGRICULTURE, 1904-1918
(thousands)

Year	Buffalos	Cows	Horses	Mules	Donkeys	Sheep	Goats	Camels
1904	646	605						
1905	708	655						
1906	775	733						
1907	761	779						
1908	751	738						
1909	728	725						
1910	675	672						
1911	657	656	51	25				
1912	652	620	47	21	691			
1913	633	637	48	23	682			
1914	568	601	11	28	632	816	331	118
1915	538	554	35	22	547	755	290	109
1916	515	493	34	17	526	688	263	95
1917	566	515	31	17	586	808	308	99
1918	571	517	30	15	583			

Source: Department of Statistics and Census, Annuaire Statistique, 1914, and following issues.

TABLE A-7

NUMBERS OF LIVESTOCK IN EGYPTIAN AGRICULTURE, 1919-1967(
(Thousands)

	Cows				Buffalos				Sheep		Goats		
	Big	Medium	Small	Total	Big	Medium	Small	Total	Big	Total	Big	Total	Donl
1919	303	122	80	505	302	162	76	540	601	858	212	326	
20	337	134	90	561	328	175	82	585	576	824	217	334	
21	358	143	95	596	362	194	90	646	690	986	276	424	
22	351	140	94	585	345	184	87	616	659	942	257	395	
23	381	152	101	634	368	196	92	656	674	962	261	401	
24	414	164	111	689	407	218	102	727	759	1085	296	455	
25	406	162	109	677	405	216	102	723	764	1091	296	455	
26	433	173	116	722	427	228	108	763	800	1144	344	530	
27	444	176	120	740	424	227	107	758	863	1232	405	622	
28	475	190	127	792	442	236	110	788	826	1180	357	548	
29	481	192	128	801	461	246	115	822	702	1003	475	731	
1930	466	186	124	776	446	238	112	796	790	1129	419	644	
31	475	190	127	792	460	246	116	822	867	1239	413	636	
32	545	218	146	909	494	264	124	882	941	1344	432	664	
33	547	218	147	912	479	256	122	857	941	1345	442	679	
34	500	230	194	924	589	174	125	888	986	1409	447	688	
35	509	214	230	953	593	181	125	899	1001	1430	474	730	
36	525	256	214	995	604	193	130	932	1047	1496	490	754	
37	597	178	208	983	682	141	133	956	1343	1919	852	1311	
39	583	210	437	1230	661	153	152	966	1328	1897	707	1088	
1941	568	242	181	991	639	166	108	913	807	1242	416	671	
43	629	325	248	1202	660	210	231	1001	925	1424	471	760	
45	661	340	264	1265	687	238	148	1064	900	1385	454	732	
47	792	284	250	1326	931	197	112	1240	1219	1875	915	1476	
1952	686	373	297	1356	738	280	194	1212	940	1254	436	703	
54	664	372	308	1344	746	298	218	1262	912	1216	456	735	
55	677	375	310	1362	791	306	226	1323	928	1237	461	743	
58	686	384	320	1390	831	320	244	1395	944	1259	448	723	
1960	744	456	388	1588	886	364	274	1524	1184	1578	516	833	
61	622	387	414	1523	961	339	201	1501	1164	1552	472	773	
62	838	392	314	1544	979	346	205	1530	1214	1619	473	776	
63	846	398	322	1566	998	352	209	1559	1268	1691	476	780	
64	857	402	328	1587	1016	358	214	1588	1328	1770	478	783	
65	868	408	332	1608	1035	366	216	1617	1391	1855	480	787	
66	880	414	336	1630	1053	372	221	1646	1460	1947	483	791	
67	892	419	340	1651	1073	379	223	1675	1533	2044	484	794	

(1) Big animals = over 3 years of age, Medium = 1-3 years, and small = less than 1

Sources: 1919-1960: Department of Statistics and Census, Annuaire Statistique, va
Livestock Census undertaken by the Ministry of Agriculture fo
1937, 1947 and 1960 when were done by the Department of Stati
with the Population Census.
1961-1967: Ministry of Agriculture, Agricultural Economy, Cairo 1966 and
Yearbook of the U.A.R., 1952-1968, Cairo June 1969.

Table A-8

Traditional Agricultural Machinery

Census Years

Tools and Implements (1)	Unit Price in 1960 £E	No. of Tools and Implements 1939	1950	1961
I. Watering:				
1. Tamhousha; Cattle-driven	34.0	59,706	83,436	83,421
2. Sakia (water-wheel);				
European	12.2	20,869	12,093)	202,700
Native	8.9	136,669	12,069)	
3. Tahout	8.1	83,673	37,765	72,364
4. Tambour (Archimidian Screw)	1.5	235,027	237,620	402,602
5. Shadouf (Water-lift)	0.7	53,362	44,679	44,679
II. Ploughing:				
6. Native Plough	1.8	564,144	603,903	661,919
III. Levelling:				
7. Qassabia	2.1	115,037	97,949	279,579
8. Lawata	0.77	139,291	139,291	139,291
IV. Threshing:				
9. Nourag (Native Thresher)	6.3	301,705	341,499	489,380

(1) Tamhousha and Tabout are different types of waterwheels. Qassabia and Lawata are heavy wooden instruments drawn by cattle to break and level the earth after ploughing.

Sources: Data on prices from Department of Statistics and Census, National Income from Agriculture, 1958-1960, Cairo, 1962, pp. 186-7, and on numbers of tools and implements, Ministry of Agriculture, Agricultural Census, 1939, 1950 and 1961.

TABLE A-9

EGYPT'S IMPORTS OF AGRICULTURAL MACHINERY, 1906-1967

£E000

YEAR	PUMPS	TRACTORS	OTHERS	TOTAL
1906				235
7				247
8				170
9				163
1910				101
11				148
12				184
13				266
14				319
15				41
16				41
17				25
18				32
19	34		10	44
1920	57	128	41	226
21	90	35	21	146
22	36	4	30	70
23	55	8	20	83
24	80	37	23	140
25	147	81	50	278
26	129	50	29	208
27	61	56	15	132
28	94	94	43	231
29	101	162	55	318
1930				273
31				229
32		23	162	185
33	96	27	18	141
34	87	45	30	162
35	106	61	30	197
36	70	81	38	189
37	117	114	37	268
38	163	73	27	263
39	155	53	15	223
1940	156	26	11	193
41				165
42				137
43		8	111	109
44	110	181	79	307
45	185	154	89	428
46	257	231	63	551
47	366	227	80	673
48	848	569	157	1,574
49	528	676	202	1,406
1950	1,233	917	206	2,356
51	1,364	1,365	344	3,073
52	1,096	794	220	2,110
53	829	272	180	1,281
54	671	825	204	1,700
55	897	1,019	238	2,154
56	1,123	1,206	335	2,664
57	1,349		1,259	2,608
1958	1,576	739	237	2,552
59	1,875	1,248	282	3,405
1960	530	2,024	196	2,750
61	693	1,803	396	2,892
62	1,794	4,623	363	6,780
63	3,399	3,510	1,581	8,490
64	3,601	2,602	927	7,130
65	3,138	1,727	490	5,355
66	2,633	1,487	1,227	5,347
67	2,272	3,110	927	6,309

Sources: 1906-17: Direction Generale de Douanes, Commerce Extérieur de l'Egypte, various issues,
1918-58: Department of Statistics and Census, Annual Statement of Foreign Trade, various issues,
1959-67: C.A.P.M.S., The Development of Foreign Trade During the Five-Year Plan (1960-65) and the Years 1965/66 and 1966/67, Cairo, 1967.

Table A-10

Egypt, Cultivated and Cropped Area
(Thousand Feddans)[1]

Year[2]	Cultivated Area	Cropped Area	Year	Cultivated Area	Cropped Area
1877	4,742	4,762	1924	5,192	8,070
1882	4,758	-	25	5,420	8,213
83	4,785	-	26	5,385	8,457
84	4,803	-	27	5,544	8,661
85	4,840	-	28	5,616	8,623
86	4,880	-	29	5,549	8,634
87	4,878	-	1930	5,549	8,634
88	4,886	-	31	5,485	8,547
89	4,913	-	32	5,464	8,216
1890	4,941	-	33	5,384	8,283
91	4,967	-	34	5,277	8,078
92	4,942	-	35	5,229	8,054
93	4,970	-	36	5,361	8,101
94	4,805	6,350	37	5,281	8,358
95	4,874	6,431	38	5,312	8,474
96	4,943	6,552	39	5,338	8,522
97	5,048	6,764	1940	5,351	8,472
98	5,088	6,848	41	5,186	8,353
99	5,186	7,033	42	5,309	9,275
1900	5,231	7,161	43	5,331	9,144
1	5,267	7,291	44	5,698	9,313
2	5,335	7,429	45	5,730	9,221
3	5,224	7,339	46	5,770	8,948
4	5,377	7,584	47	5,761	9,167
5	5,404	7,563	48	5,753	9,163
6	5,340	7,480	49	5,834	9,167
7	5,403	7,662	1950	5,671	9,233
8	5,327	7,598	51	5,687	9,277
9	5,374	7,761	52	5,672	9,308
1910	5,345	7,712	53	5,715	9,377
11	5,264	7,546	54	5,744	9,909
12	5,285	7,681	55	5,745	9,966
13	5,283	7,712	56	5,771	9,962
14	5,023	7,402	57	5,756	10,312
15	5,309	7,892	58	5,843	10,349
16	5,232	7,715	59	5,865	10,296
17	5,269	7,677	1960	5,879	10,397
18	5,282	7,821	61	5,905	10,300
19	5,298	7,692	62	5,977	10,365
1920	5,305	7,807	63	6,023	10,357
21	5,354	8,060	64	6,145	10,377
22	5,341	8,205	65	6,044	10,261
23	5,387	8,104	66	6,462	10,488
			67	6,462	10,488

Sources: 1877. A.E. Crouchley, The Economic Development of Modern Egypt, London, 1938, Statistical Appendix, Table 3, p.259.
1882-93. Government of Egypt, Statistical Returns, 1881-97, p.12. These figures refer to tax-paying agricultural land which is slightly in excess of the actual cultivated area.
1894-1959. Egypt, Department of Statistics, Annuaire Statistique, Annual.
1960-1967. U.A.R., Central Agency for Public Mobilization and Statistics, Statistical Yearbook of the U.A.R., 1952-1968, Cairo, 1969, p.23. These figures include newly-reclaimed areas such as the Liberation Province.

1. Figures given are for the agricultural year, September 1st to August 31st.
2. 1 Feddan = 1.038 acres.

Table A-11

Supply of Chemical Fertilizers

Year	Total Supply '000 Tons (1)	Total Supply Value £E.m (2)	Fertilizer Inputs per Feddan of Cultivated Area Kg. (3)	Fertilizer Inputs per Feddan of Cropped Area Kg. (4)	Year	Total Supply '000 Tons (1)	Total Supply Value £E.m (2)	Fertilizer inputs per Feddan of Cultivated Area Kg. (3)	Fertilizer inputs per Feddan of Cropped Area Kg. (4)
1902	2.2	0.1	0.4	0.3	1945	292	7.6	51.0	31.7
1907	23.1	0.6	4.3	3.0	1946	236	6.1	40.9	26.4
1912	70	1.8	13.2	9.1	1947	485	12.6	84.2	52.9
1913	72	1.9	13.6	9.3	1948	567	14.7	98.6	61.9
1914	73	1.9	14.5	9.9	1949	727	18.9	124.6	79.3
1917	37	1.0	7.0	4.8	1950	779	20.3	137.4	84.4
1922	118	3.1	22.1	14.4	1951	830	21.6	145.9	89.5
1927	225	5.9	40.6	26.0	1952	876	22.8	154.4	94.1
1928	275	7.2	49.0	31.9	1953	759	19.7	132.8	80.9
1929	328	8.5	59.1	38.0	1954	877	22.8	152.7	88.5
1932	235	6.1	43.0	28.6	1955	866	22.5	150.7	86.9
1934	422	11.0	80.0	52.2	1956	808	21.0	140.0	81.1
1935	562	14.6	107.5	81.0	1957	1197	31.1	208.0	116.1
1936	577	15.0	107.6	71.2	1958	1327	34.5	227.1	128.2
1937	660	17.2	125.0	79.0	1959	1315	34.2	224.2	127.7
1938	534	13.9	100.5	63.0	1960	1372	35.8	234.2	132.4
1939	485	12.6	90.0	56.9	1961	1576	41.0	266.9	153.0
1940	405	10.5	75.7	47.8	1962	1602	41.7	268.0	154.6
1941	22	0.6	4.2	2.6	1963	1722	44.8	285.9	166.3
1942	161	4.1	30.3	17.4	1964	1915	49.8	311.6	184.5
1943	176	4.6	33.0	19.2	1965	2139	55.6	353.9	208.5
1944	297	7.7	52.1	31.9	1966	1979	51.5	306.3	188.7

Sources: (1) Supply figures are expressed in terms of 15.5% Azot. To adjust the figures of other kinds of fertilizers, figures for super-phosphate were multiplied by 15% and then divided by 15.5, and for potassium sulphate figures were multiplied by 48 and divided by 15.5. For the years before 1935 see A. El-Tanamly, the Development of the Egyptian Agricultural Economy in the Last Fifty Years, L'Egypt Contemporaine, 1960, p.121. From 1935 to 1959, figures from the Annuaire Statistique. From 1960 onwards data from Ministry of Agriculture, Agricultural Economy, July, 1968, pp.41-8. All these figures represent the supply of fertilizers, i.e. home production plus imports, and not actual consumption.

(2) Value is at 1960 constant prices. Fertilizer prices are usually controlled by the government and enjoy notable stability. The 1960 price, which is prevailing until now is £E26 per ton. This price represents an average of prices of different kinds of fertilizers converted to their equivalent of 15.5% Azot. Information from the price list of the Egyptian General Agency for Agricultural and Cooperative Credit, Fertilizers Department, File No. 1/3/21, and Department of Statistics, Monthly Bulletin of Agricultural and Economic Statistics, December 1960, Cairo, 1962, Table 10, p.25.

TABLE A-12

YIELDS OF THE MAJOR CROPS(1)
(ANNUAL AVERAGE PER FEDDAN)

Year	Cotton Kantars	Wheat ardab	Maize ardab	Beans ardab	Barley ardab	Rice dariba	Sugar Kantars
1880-4	3.43	3.29		2 .37	2.37		
1885-9	3.43	3.54		2.45	2.89		
1890-4	5.21	4.56		3.23	3.98		
1895-9	5.47	5.12		3.55	3.97		
1900-4	4.67	5.37		3.78	3.71		
1905-9	4.03	5.72		3.43	3.57		
1910-14	4.27	4.88	6.74	4.97	5.64	1.33	636
1915-19	3.58	4.68	7.01	4.44	5.60	1.39	662
1920-24	3.67	4.78	6.53	4.35	5.65	1.22	684
1925-29	4.63	4.85	6.98	4.27	5.79	1.39	700
1930-34	4.36	5.19	6.90	4.38	5.97	1.31	720
1935-39	5.20	5.90	7.32	4.86	7.30	1.54	767
1940-44	5.39	4.93	5.65	4.95	6.70	1.35	641
1945-49	5.14	4.84	6.26	4.82	6.25	1.66	613
1950-54	4.73	5.54	6.40	4.44	7.20	1.65	762
1955-59	5.19	6.52	6.20	4.85	8.36	2.22	859
1960-64	5.14	7.24	7.54	5.02	9.26	2.33	861
1965-67	5.24	7.46	10.50	5.24	8.05	2.18	843

(1) Kantar = 44.928 Kg., Ardab = 198 Litres and Dariba = 935 Kg. approximately.

Sources: Before 1910-14, figures represent yields on State Domains only
Annuaire Statistique, 1914, pp.459-460. For the period 1910/14-1950/54, Annuaire Statistique, and from then on to 1965-67, Ministry of Agriculture, Agricultural Economy, Cairo, 1968, pp.108-272.

TABLE A-13

EGYPT'S IMPORTS OF INDUSTRIAL MACHINERY AND EQUIPMENT :

1. 1882-1913

£E000

Year	Value of Imports
1882	165
83	142
84	160
85	161
86	132
87	505
88	261
89	104
90	188
91	167
92	272
93	152
94	287
95	310
96	418
97	226
98	280
99	431
1900	467
1901	503
2	427
3	485
4	781
5	584
6	708
7	638
8	427
9	330
10	368
11	546
12	569
13	646

Sources: 1882-1884; U.K., Statistical Abstract for the Foreign Countries, London, 1894,
1885-1913; Egypte, Direction Generale de Douanes, Commerce Exterieur de l'Egypte, various issues.

2. 1914-1919

Items of Imports	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
I. Industrial Mach. (Non-Elect.):	270	72	103	87	151	203	767	542	402	414	560	840	627	452	611	643	
Industrial Implements and Tools.					49	76	176	119	99	91	99	108	117	86	83	101	
Tools made of Steel						14	12	3	6	7	11	14	17	13			
Stationery - Steam Engines					35		6	7	2	-		1			1	1	
Stationery - Internal Combustion					54	87	481	303	222	255	400	650	425	278	452	461	
Portable Steam Engines					13		37	21	20	21	9	19	16	3	7	4	
Portable Internal Combustion						14	1	3	2	1		3	1	1	1	1	
Boilers						9	30	45	23	14	9	9	5	27	27	41	
Machine Tools and Parts						3	24	41	28	25	32	36	46	44	40	54	
II. Industrial Mach. (Electric):	36	18	9	12	20	19	135	237	196	144	147	165	152	212	185	307	
Electric Machines and Parts.																	
III. Textile Machines and Parts						11	63	26	3	7	7	8	3	3	39	55	
IV. Other Machinery:	172	64	81	79	97	316	856	1164	22	529	564	785	556	622	570	770	
V. Parts of Mach. (N.E.S.):	8	5	9	11	27	72		27	49	64	58	36	70	20	81	84	
Machine Belting					27	72		27	49	64	58	36	70	20	81	84	
Total	486	159	202	189	295	621	1821	1996	672	1158	1336	1834	1408	1309	1486	1859	2486

Source: 1914-1917, Egypte, Direction General des Douanes, Commerce Exterieur de l'Egypte, various issues.
1918-1930, Department of Statistics and Census, Annual Statement of Foreign Trade, various issues[1]

3. 1931-1958

Year	Industrial Machinery (non-Elect)	Parts of Non-Elect Mach	Industrial Machinery (Electric)	Parts of Elect Mach.	Textile Machinery	Parts of Textile Mach.	Total
1931	774	251	638	42	17	29	1,751
32	665	225	420	38	132	18	1,498
33	508	184	422	43	66	18	1,241
34	571	241	334	51	241	12	1,450
35	658	317	408	61	199	22	1,665
36	759	282	331	56	111	18	1,557
37	1,034	356	318	64	264	24	2,060
38	893	466	441	42	206	17	2,065
398	806	417	421	56	376	66	2,142
1940	382	297	319	51	89	55	1,193
41	354	200	173	71	84	55	937
42	213	224	226	166	175	63	1,067
43	176	283	321	49	53	47	929
44	533	424	147	60	24	79	1,267
45	860	606	378	54	48	99	2,045
46	1,811	1,085	1,101	131	1,139	323	5,590
47	2,915	1,316	1,451	109	2,359	619	8,769
48	4,476	2,293	2,374	441	3,016	1,331	13,931
49	6,174	4,083	2,656	474	2,423	756	16,566
1950	6,793	3,639	3,340	650	1,483	615	16,520
51	8,169	3,197	3,659	1,061	1,573	991	18,650
52	8,618	3,926	3,872	1,115	1,420	820	19,771
53	5,925	2,548	3,647	868	845	945	14,778
54	6,911	3,817	3,406	900	1,756	867	17,657
55	11,285	4,105	5,888	1,000	4,854	1,003	28,135
56	16,460		6,710		4,950		28,120
57	10,860		3,660		2,080		16,600
58	19,110		5,600		4,600		29,310

Source: Department of Statistics and Census, Annual Statement of Foreign Trade, various issues.

4. 1959-1967

Items of Imports	1959	1960	1961	1962	1963	1964	1965	1966	1967
I. Food Processing:	3	5	588	304	1,201	2,078	1,407		
Bottling and Canning Machines			17	396	349	207	260		
Bakery and Food Processing Machines	3	5	23	100	166	1,186	384		
Freezing units			465	718	512	489	261		
Parts of Freezing units			83	90	174	196	502		
II. Textiles	6,363	5,971	3,794	4,278	6,766	3,061	2,285	2,200	2,100
Textile and Threads Machines				568	1,385	600	246		
Textile looms	5,022	4,405	2,555	1,278	1,239	499	184		
Auxiliary Machines for Textiles	1,341	1,566	1,183	2,016	2,947	878	1,522		
Sewing Mach. (not for home use)			4	69	80	27	62		
Bleaching and Printing Machines			52	347	1,115	1,057	271		
III. Paper and Printing:	533	590	283	2,080	1,345	1,272	3,474	3,700	600
Paper pulp-processing Machines	231	122	7	1,360	725	570	2,433		
Paper-cutting machines			15	32	68	105	169		
Printing Machines			129	601	471	548	654		
Type-setting machines	302	468	132	87	81	49	218		
IV. Metallic and Engineering:	11,131	8,789	6,257	8,127	8,750	8,595	16,232	13,600	9,300
Metal-smoothing machines	66	31	67	124	116	102	146		
Mach.for Metal, Wood and Pottery Works	3	10	439	1,556	1,582	1,597	2,294		
Boxes for Metal-shaping			38	159	180	145	238		
Machines for sifoning and mixing.			510	469	1,132	475	5,977		
Metal Polishing machines			3	44	101	115	158		
Other automatic appliances and machines	10,208	7,381	2,771	1,901	1,327	3,083	1,735		
Lifts (for goods)	137	211	150	106	322	219	259		
Other lifting machines	630	654	841	649	1,403	1,018	313		
Excavation and levelling machines	87	502	1,456	3,119	2,587	1,841	5,112		
V. Electric Machinery:	7,972	8,227	9,251	13,518	22,305	21,662	21,051	30,200	19,100
Boilers and Steam generators	93	163	660	1,609	3,041	1,912	3,127		
Auxiliary Applainces for generators	63	56	485	607	622	311	74		
Gas boilers				5	18	2,310	75		
Turbines			1	213	1,693	1,787	2,865		
Air pumps			211	526	1,319	601	1,881		
Heaters for Refining, Sterilizing			52	366	1,380	405	839		
Electric Melting Furnaces			80	282	475	268	488		
Parts of Machines without electric connections	2,520	3,201	2,840	2,977	4,198	3,193	1,108		
Electric generators, motors and transformers	1,096	1,239	1,648	2,522	3,805	7,049	6,237		
Electric Rectifiers and Connections			41	150	549	167	191		
Electric appliances for carrying electric current	3,396	2,919	2,300	2,601	2,943	2,706	3,071		
Electric accumulators	85	66	80	52	184	77	124		
Parts of accumulators	189	239	248	252	334	235	231		
Electronic bulbs and tubes	136	151	129	431	470	222	289		
Electric generating cells	394	193	330	481	289	276	402		
Electric appliances and machines (n.e.s.)			146	444	985	143	49		
VI. Scientific and Office Machines:	917	1,012	1,949	4,370	5,422	3,506	4,463	1,800	1,100
Typewriters	178	162	213	407	282	324	223		
Calculating and Cash machines	202	217	310	393	602	371	536		
Statistical punching machines			10	211	333	162	95		
Microscopes and parts	66	55	35	158	197	121	106		
Monometric Machines	26	27	95	335	515	363	576		
Machines for physical and electric analysis	17	23	46	227	311	193	226		
Electric, liquid and gas meters	129	225	326	344	177	156	55		
Electric and electronic appliances for analysis			110	522	542	342	441		
Parts of electronic applainces for analysis	156	190	260	250	275	137	106		
Taps for reservoirs and boilers			336	1,267	1,831	1,185	1,682		
Surveying apparatus	9	24	118	108	100	99	236		
Design appliances and slide-rules	134	89	90	148	257	53	181		
VII. Other machines and parts:	4,616	3,861	3,670	5,856	4,974	2,783	3,349		
Bricks and concrete for melters	402	321	216	398	479	249	530		
Iron and Steel tubes and pipes	261	427	356	408	325	320	231		
Unfinished tubes and pipes	3,696	2,792	2,906	4,818	2,922	2,013	2,229		
High-pressure steel tubes for generators			30	78	963	55	158		
Belting for machines	257	231	162	154	285	146	201		
Total	31,535	28,455	25,810	38,533	50,763	42,957	52,261	51,300	32,200

Source: C.A.P.M.S., Development of Foreign Trade During the 5-Year Plan for Economic and Social Development (July, 1960-June, 1965), and the Years 1965/66 and 1966/67, Cairo, 1967. pp.303-316.

Table A - 14

Paid-Up Capital and Debentures of Industrial Companies in 1899

£E000

Name of Company	Foundation Year	Paid-Up Capital	Debentures
I. Cotton Ginning and Pressing			
1. Kafr el Zayat Cotton Co. Ltd.	1894	80.0	25.2
2. Soc. d'Egrenage de Mehalla el Kibira	1897	12.5	-
3. Soc. d'Egrenage de Coton a Zagazig	1893	15.6	3.0
4. Soc. Anon. de Presses Libres Egyptien	1897	50.0	26.4
5. Soc. Générale de Pressage et de Dépôt	1889	200.0	120.0
II. Manufacturing			
1. Anglo-Egyptian Spinning and Weaving Co. Ltd.	1899	125.0	1.5
2. Boulangerie Mécanique d'Egypte (Soc. Anon.)	1899	20.0	
3. The Egyptian Aerated Water Co. Ltd.	1899	2.4	
4. Egyptian Cotton Mills, Ltd.	1899	160.0	-
5. Egyptian Salt and Soda Co. Ltd.	1899	301.0	-
6. Egyptian Sugar and Land Co. Ltd.	1896	125.0	70.0
7. Fabrique Egyptien de Papier	1897	7.7	
8. Savonnerie du Gabbari	1898	25.0	
9. Soc. Anon. des Ciments d'Egypte	1899	60.0	
10. Soc. Anon. "Crown Brewery" (Alex.)	1897	40.0	16.0
11. " " " " of Cairo	1899	60.0	
12. Soc. Anon. "Le Khédive" (Cigarettes)	1888	40.0	
13. Soc. Anon. des Moulins d'Egypte	1875	140.0	
14. Soc. Egyptien de Tabacs	1899	25.0	
15. Soc. Générale des Sucreries et de la Raffinerie d'Egypte	1892	400.0	1,200.0
16. Soc. des Huileries et Savonneries d'Egypte	1889	45.0	25.0
17. Soc. Anon. de Karmous, Selim Sonaya & Co. (soap)	1899	23.0	
18. Tabacs et Cigarettes Matossian S.A.	1899	100.0	
Total		2,057.2	1,487.1

Total capital and debentures £E3,544.3 million.

Source: The British Chamber of Commerce of Egypt, Alexandria, List of Financial, Manufacturing, Transport and Other Companies Established in Egypt, 3rd edition, June 1901, pp.18-36.

TABLE A-15

CHANGES IN PAID-UP CAPITAL AND DEBENTURES OF JOINT STOCK COMPANIES OPERATING IN EGYPT, 1883-1933

£E million

Year	Mortgage Banks		Banking and Financial		Land and Urban Development		Transport		Industry		Commercial		Suez Canal		Others		Total	
	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%
1883	3.8	17.3	1.8	8.4	0.2	0.8	0.06	0.0	0.5	2.2			15.6	71.0			22.0	100
1892	4.5	16.9	0.8	3.0	0.6	2.2	0.1	0.4	1.2	4.6	0.05	0.2	19.3	72.3			26.7	100
1897	6.0	18.3	0.8	2.4	1.3	4.0	2.2	6.7	3.5	10.8	0.2	0.6	18.0	57.9			32.8	100
1902	10.5	23.5	2.3	5.2	3.0	6.7	4.0	9.0	5.7	12.8	0.8	1.8	18.4	41.3	0.04	0.1	44.6	100
1907	39.7	38.0	8.1	7.8	19.4	18.5	5.9	5.7	11.7	11.2	1.9	1.9	17.2	6.5	0.5	0.5	104.2	100
1911	52.2	45.0	6.9	5.9	19.8	17.1	5.8	5.0	12.8	11.0	1.7	1.5	16.4	14.1	0.3	0.3	116.0	100
1914	54.6	46.9	5.7	4.9	18.6	16.0	6.1	5.2	13.6	11.7	1.4	1.2	16.2	13.9	0.2	0.2	116.4	100
1915	54.2	46.1	5.7	4.9	18.6	15.8	6.0	5.1	13.6	11.6	1.4	1.2	17.8	15.1	0.2	0.2	117.5	100
1919	52.9	45.8	5.7	4.9	16.9	14.6	5.6	4.8	12.6	10.9	2.3	2.0	19.1	16.5	0.3	0.3	115.5	100
1920	52.0	45.2	5.9	5.2	16.0	13.9	5.4	4.7	13.5	11.8	3.1	2.7	18.6	16.2	0.3	0.3	114.8	100
1921	51.3	45.3	5.9	5.2	14.9	13.2	5.4	4.8	14.1	12.5	3.2	2.8	18.0	15.9	0.3	0.3	113.2	100
1922	50.7	45.6	6.4	5.8	14.3	12.8	5.1	4.6	13.8	12.4	2.8	2.5	17.7	15.9	0.5	0.4	111.3	100
1923	47.3	44.2	6.3	5.9	13.9	13.0	5.0	4.7	13.6	12.7	3.2	3.0	17.4	16.3	0.2	0.2	107.0	100
1924	45.9	43.8	6.7	6.4	13.5	12.9	4.8	4.6	13.5	12.9	3.3	3.1	17.1	16.3	0.2	0.2	104.9	100
1925	45.5	44.0	6.1	5.9	13.2	12.8	4.7	4.5	13.3	12.9	3.6	3.5	16.8	16.2	0.2	0.2	103.5	100
1926	44.5	43.7	5.9	5.8	12.7	12.5	4.9	4.8	13.2	13.0	3.9	3.8	16.5	16.2	0.2	0.2	101.8	100
1927	44.6	41.3	6.1	5.7	12.7	11.7	5.1	4.7	14.2	13.1	9.0	8.3	16.2	15.0	0.3	0.2	108.2	100
1928	44.6	40.5	6.0	5.4	12.2	11.1	5.2	4.7	14.6	13.3	11.3	10.3	15.8	14.4	0.4	0.4	110.1	100
1929	44.8	40.6	6.3	5.7	12.5	11.3	4.7	4.3	14.8	13.4	11.2	10.2	15.5	14.1	0.6	0.5	110.3	100
1930	44.9	40.7	6.1	5.6	12.5	11.4	4.8	4.3	14.9	13.5	11.2	10.2	15.1	13.7	0.6	0.5	110.2	100
1931	44.6	38.4	6.2	5.3	12.3	10.6	4.9	4.2	15.3	13.2	11.0	9.5	21.2	18.3	0.6	0.5	116.1	100
1932	45.3	38.7	6.2	5.3	12.4	10.6	5.2	4.4	15.4	13.1	11.3	9.6	20.9	17.8	0.6	0.5	117.2	100
1933	40.6	36.3	5.9	5.2	12.3	11.0	5.3	4.8	15.2	13.6	11.2	10.0	20.7	18.5	0.6	0.5	111.9	100

Source: A.E. Crouchley, The Investment of Foreign Capital in Egyptian Companies and Public Debt, Cairo, 1936, Table II, p.105.

TABLE A-16

PAID-UP CAPITAL AND DEBENTURES OF COMPANIES OPERATING IN EGYPT, 1883-1934

£E000

	Held Abroad	Held in Egypt	Total	Held Abroad	Held in Egypt	Total	Held Abroad	Held in Egypt	Total
		1883			1892			1897	
Mortgage	3401	425	3826	4122	425	4547	5543	425	5968
Banks and Financial	1843	-	1843	681	93	774	681	93	774
Agricultural and Urban Land	-	180	180	221	368	589	360	982	1342
Transport and Canal	62	-	62	145	-	145	1851	367	2218
Industrial and Mining and Commercial	669	-	669	915	356	1271	2974	609	3583
Total	5975	605	6580	6084	1242	7326	11409	2476	13885
		1902			1907			1914	
Mortgage	9601	924	10525	34090	5590	39680	48369	6200	54569
Banks and Financial	1770	522	2292	4895	3200	8095	3229	2498	5727
Agricultural and Urban Land	2096	878	2974	7135	12221	19356	7261	11312	18573
Transport and Canal	3245	725	3970	3620	2327	5947	3988	2088	6076
Industrial, Mining and Commercial	5418	1101	6519	7170	6928	14098	8406	6801	15207
Total	22130	4150	26280	56910	30266	87178	71253	28899	100152
		1934							
Total	46039	45183	91222						

Source: A.E. Crouchley, The Investment of Foreign Capital in Egyptian Companies, and the Public Debt, Cairo, 1936, pp.147 and 155-6.

TABLE A-17

GROSS NATIONAL PRODUCT,(1)

1. 1945-52, at Constant 1954 Prices

£E million

	Agriculture		Industry + Electricity		Construction		Transport + Communication		Housing		Trade + Finance		Services (incl Government)		Total		Annual Rate Growth
	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%	£Em	%	
1945	303	41	91	12	19	3	38	5	50	7	122	16	117	16	740	100	
46	302	39	92	12	22	3	43	6	51	7	142	18	121	16	773	100	4.5
47	299	38	101	13	25	3	46	6	53	7	147	18	126	16	797	100	3.1
48	328	37	113	13	31	3	61	7	56	6	169	19	133	15	891	100	1.8
49	325	35	126	13	25	3	72	8	59	6	190	20	145	15	942	100	5.7
1950	303	31	133	14	22	2	78	8	62	6	210	22	157	16	965	100	2.4
51	304	31	132	13	36	4	81	8	65	7	209	21	167	17	994	100	3.0
52	334	33	132	13	30	3	81	8	68	7	193	19	181	18	1019	100	2.5
Average:																	
1945-52	312	35	115	13	26	3	63	7	58	7	173	19	143	16	890	100	4.4
1952-53	325	33	140	14	25	3	54	5	59	6	170	17	217	22	990	100	
53-54	315	32	143	14	27	3	55	6	56	6	161	16	232	23	989	100	-0.1
54-55	318	31	152	15	26	3	58	6	62	6	164	16	235	23	1015	100	2.6
55-56	329	31	163	15	25	3	62	6	65	6	174	16	237	23	1055	100	3.9
56-57	339	31	174	16	28	3	58	5	67	6	175	16	236	22	1077	100	2.1
57-58	355	31	190	17	33	3	62	5	68	6	193	17	240	21	1141	100	5.9
58-59	376	31	202	17	38	3	69	6	70	6	209	17	245	20	1209	100	6.0
59-60	392	31	213	17	42	3	88	7	73	6	217	17	259	20	1284	100	6.2
Average:																	
1952/3-59/60	344	31	172	15	31	3	63	6	65	6	183	17	238	22	1095	100	3.4
2. 1959/60-1969/70, at Constant 1959/60 Prices																	
1959-60	405	32	266	21	41	4	93	7	73	6	129	10	272	21	1285	100	
60-61	403	30	298	22	44	3	102	8	74	5	145	11	298	22	1364	100	6.1
61-62	373	26	326	23	74	5	117	8	76	5	152	11	294	21	1411	100	3.4
62-63	426	28	348	23	84	5	127	8	78	5	154	10	321	21	1537	100	8.9
63-64	453	27	388	23	96	6	144	9	79	5	148	9	362	22	1670	100	8.6
64-65	477	27	407	23	93	5	158	9	80	5	152	9	396	22	1762	100	5.5
Average:																	
1959/60-64/5	422	28	339	22	72	5	124	8	77	5	147	10	324	22	1505	100	5.4
1965/66	482	26	418	23	95	5	174	10	81	4	163	9	428	23	1841	100	4.4
66-67	473	25	421	23	89	5	180	10	84	5	172	9	446	24	1866	100	1.4
67-68	488	26	413	23	77	4	101	6	121	7	173	9	475	26	1848	100	-1.0
68-69	493	25	451	23	105	5	103	5	123	6	180	9	499	26	1954	100	5.7
69-70	525	25	485	23	114	6	114	6	126	6	190	9	535	26	2089	100	6.9
Average:																	
1965/6-69/70	492	25	438	23	96	5	134	7	107	6	176	9	477	25	1920	100	2.9

(1) From 1945-1959/60 at market price and from 1959/60-69/70 at factor cost.

Sources: 1945-52: B. Hansen and D. Mead, The National Income of the U.A.R. (Egypt), 1939-62, I.N.P., Memo.35 Cairo, 1963, Table 4.

1952/53-59/60: D. Mead, Growth and Structural Change in the Egyptian Economy, Illinois, 1967, Table pp.288-9.

1959/60-69/70: Ministry of Planning, Follow-Up and Appraisal of Economic Growth for the Years 1959/ 1964/65 and 1966/67-1969/70.

TABLE A-19

EMPLOYMENT BY INDUSTRIAL SECTOR IN CENSUS YEARS
(Thousands)

	1907		1917		1927		1937		1947		1960	
Agriculture	2,343	68.3	2,932	68.0	3,539	67.5	4,020	69.5	4,075	61.7	4,406	56.3
Mining	4	0.1	3	0.1	10	0.2	11	0.2	13	0.2	21	0.3
Manufacturing	281	8.2	361	8.4	422	8.1	345	6.0	553	8.4	713	9.1
Electricity, Gas and Water	n.s.	-	5	0.1	23	0.4	21	0.4	23	0.3	37	0.5
Construction	95	2.1	60	1.4	86	1.6	117	2.0	112	1.7	159	2.0
Trade and Finance	161	4.7	324	7.5	459	8.7	436	7.5	588	8.9	641	8.2
Transport and Communication	101	2.9	151	3.5	196	3.7	137	2.4	202	3.0	260	3.3
Services	448	13.0	473	11.0	514	9.8	696	12.0	1,046	15.8	1,595	20.3
Total (1)	3,433	100.0	4,309	100.0	5,249	100.0	5,783	100.0	6,610	100.0	7,833	100.0
Total Population (2)	11,287		12,751		14,218		15,933		19,022		26,085	
1 ÷ 2 %	30.4		33.8		36.9		36.3		34.8		30.0	

Source: Department of Statistics and Census, Population Census of Egypt, 1907-1960.

TABLE A-19

ESTIMATE OF EMPLOYMENT BY INDUSTRIAL SECTOR, 1959/60-1969/70
(Thousands)

	1959-60		1964-65		1967-68		1969-70	
Agriculture	3245	54.0	3751	50.9	3892	49.7	4048	48.9
Industry	602	10.0	825	11.2	867	11.1	916	11.0
Electricity	12	0.2	18	0.2	19	0.3	23	0.3
Construction	185	3.1	345	4.7	260	3.3	388	4.2
Transport and Communications	219	3.6	284	3.8	330	4.2	347	4.2
Trade and Finance	636	10.6	730	9.9	786	10.0	802	9.7
Housing	16	0.3	21	0.3	134	1.7	136	1.7
Public Utilities	25	0.4	30	0.4	32	0.4	34	0.4
Services (including Government)	1067	17.8	1370	18.6	1507	19.3	1581	19.1
Total (1)	6006	100.0	7374	100.0	7828	100.0	8275	100.0
Total Population (2)	25832		29389		31693		33329	
1 ÷ 2 %	23		25		25		25	

Source: Ministry of Planning, Follow-up and Appraisal of Economic Growth, 1960/61-64/65 and 1969/70. These estimates are to be taken with great caution in the common year, 1960 and therefore cannot be compared with census figures except in as much as they show changes in the structure of employment over the last decade.

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